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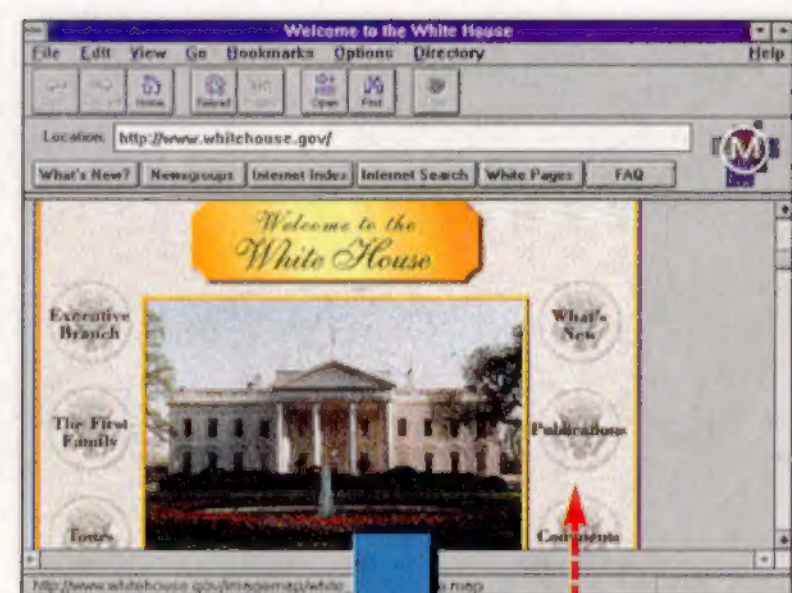
Network Edition

Web Browsers and Servers: Choosing
The Tools for Your Internet Exploits

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MAGAZINE**

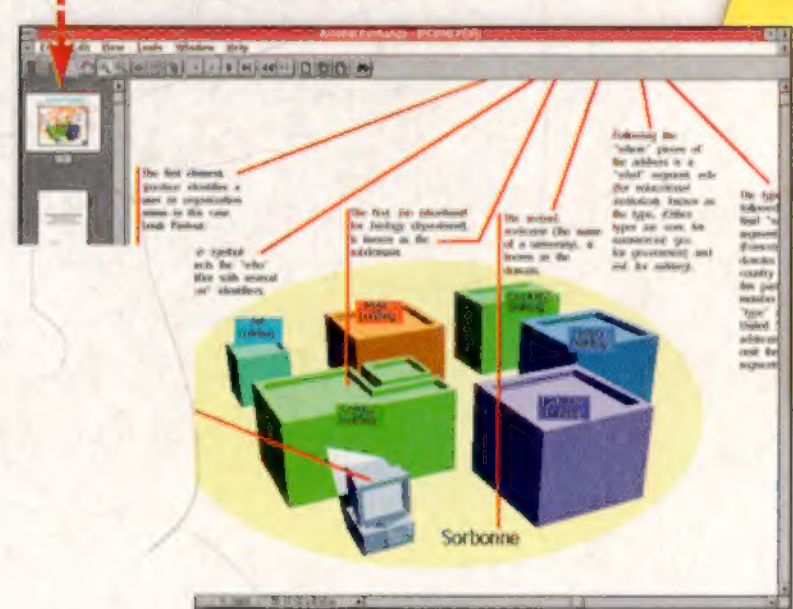
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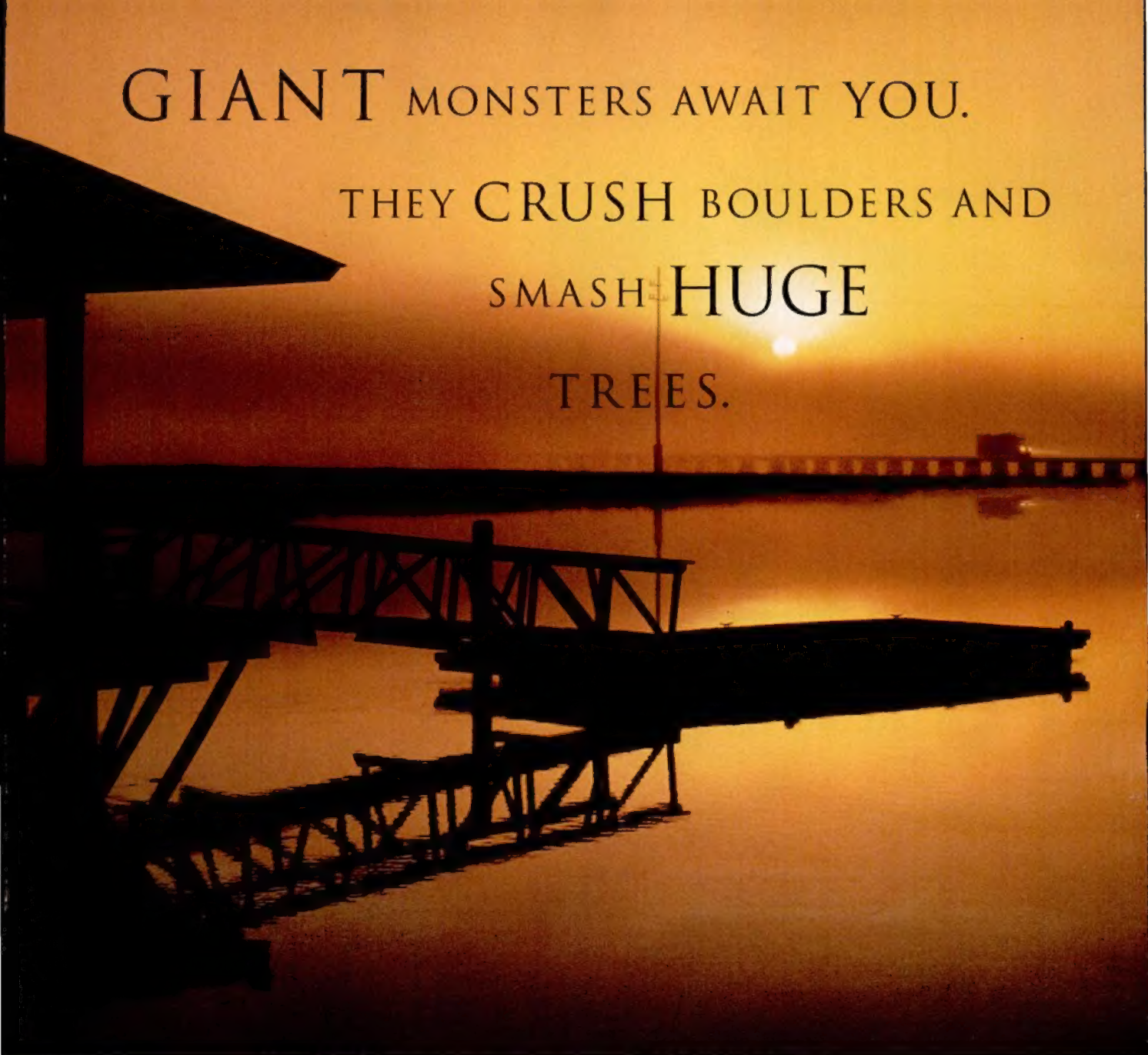
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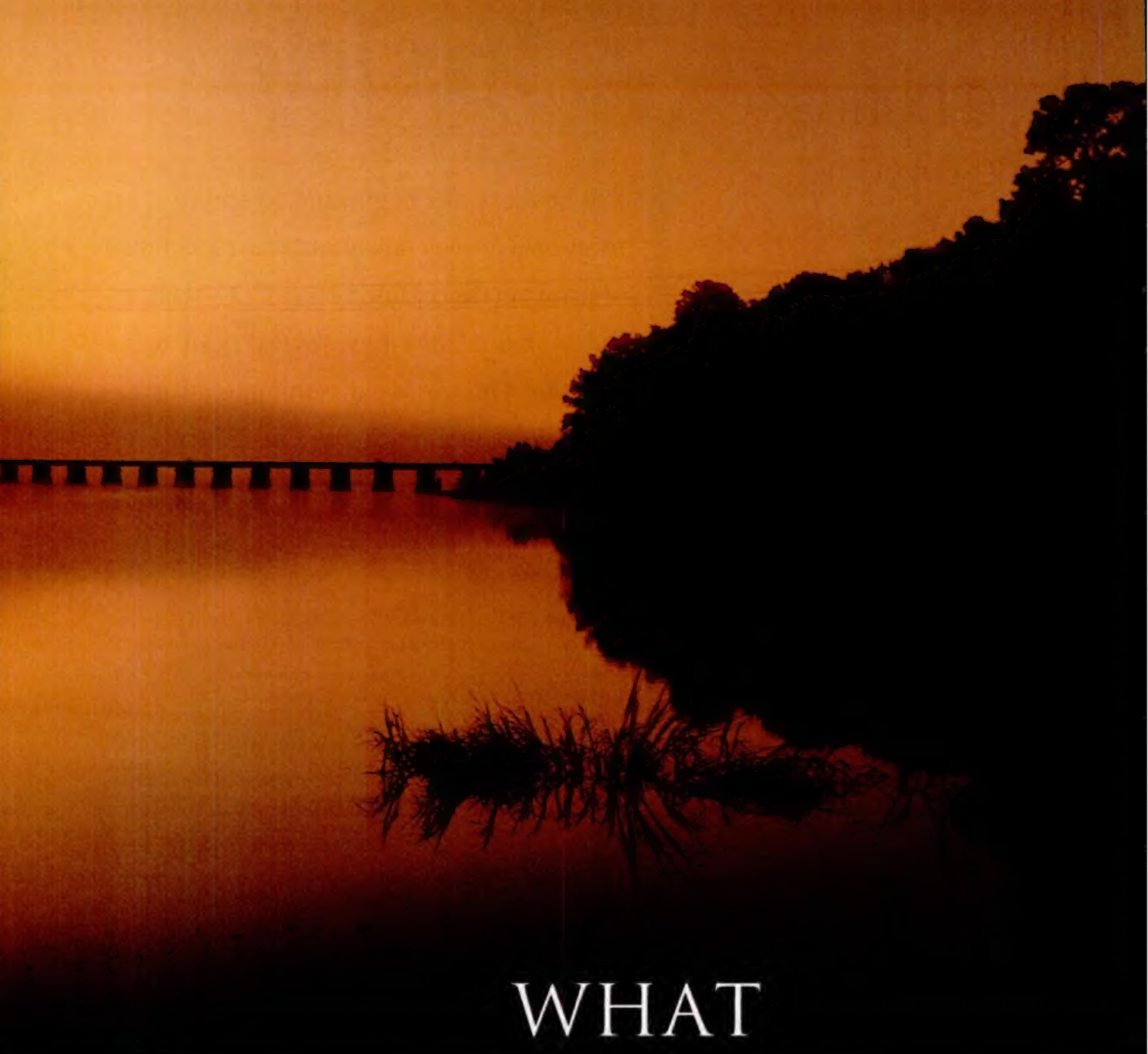
IF YOU'RE F. MICHAEL WILCOX,

you take Microsoft Office® Everywhere. You see, as a Specialist for G.E.'s Apparatus Service Department, Mr. Wilcox wrestles with the machines they use at big mining operations and pulp mills.

One of these babies goes down and a company can start losing \$40,000 an hour, which makes Microsoft Office extremely important to Mike. Oh, he's tried other things. But he doesn't like to talk about it. He'd rather tell you that during the first year of rollout, he and Microsoft Office saved one of his customers a whopping \$375,000. (Now imagine putting that on *your* résumé.)

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Inside

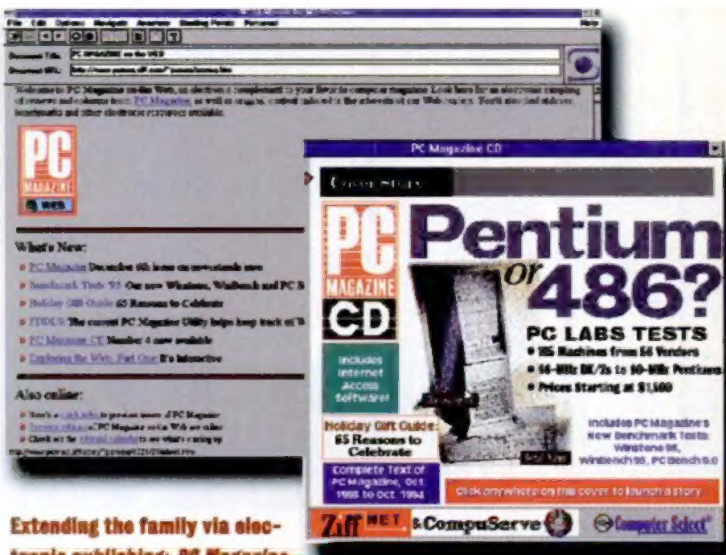
If publishers are beginning to sound a bit hysterical as they talk about the importance of print versus on-line versus CD—well, indulge them: They have every right to be nervous. The way we disseminate information—be it in a magazine like this one, an

annual report, a phone book, a shopping catalog, a technical document, or some other form—is rapidly changing. And those who triumph will be the ones who understand the nature of the change.

The creation of an electronic document requires you to choose

HTML, portable document software, and hypertext. We also took a look at Web browsers, which let you explore the graphical world of the Internet's World-Wide Web documents.

Certainly the tale of electronic publishing has not been lost on



Extending the family via electronic publishing: PC Magazine—the Internet and CD versions.

among a perplexing set of tools. Our special report on electronic publishing points you towards the products that make the move to electronic publishing possible.

Lance Ulanoff and Jeff Mace headed up our efforts as we focused on the four areas of electronic document creation: SGML,

us. PC Magazine CD, *PC Magazine* in its various on-line incarnations, and *PC Magazine* the print publication may all have different presentations, but the mission remains the same: to bring you the most comprehensive comparative reviews in the industry.

—Robin Raskin

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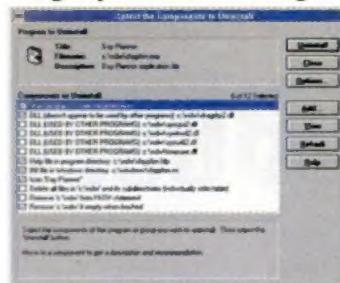
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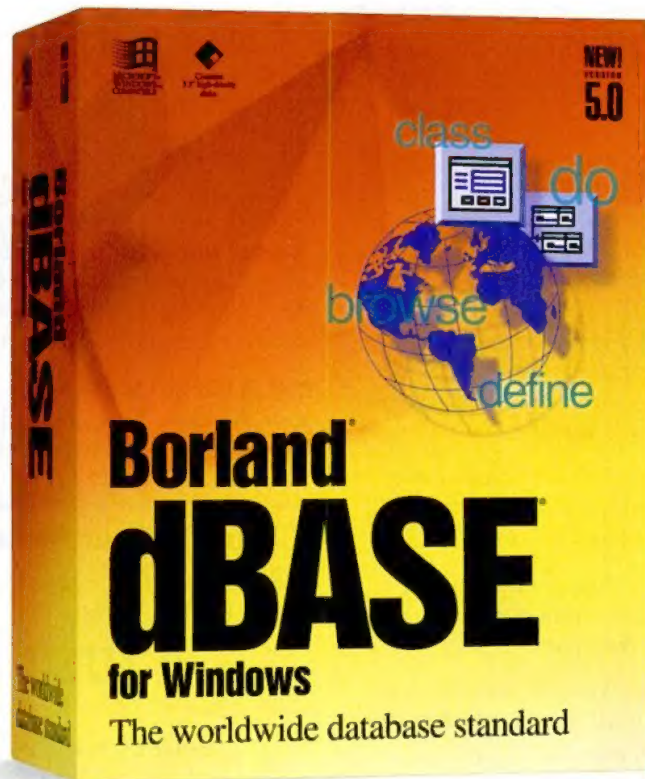
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COVER STORY

Graphics

ELECTRONIC PUBLISHING:

Publish Without Paper!



BY LORI GRUNIN

Electronic publishing creates documents that may never see the printed page—and usually nobody cares. That's their appeal: The information remains live, which makes it easy to update data and facilitates searching and indexing. This special report explores a variety of solutions—portable document tools, hypertext authoring tools, SGML suites, and HTML packages—to help you find the electronic publishing tools and delivery channels that fit your organization's needs110

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Software

Web Browsers:
The Web Untangled

BY RICK AYRE AND KEVIN REICHARD Web browsers are coming out of the woodwork—and with good reason. The World-Wide Web is quickly becoming *the* place to be on the Internet for both businesses and individual users. And because Web browsers are as necessary to accessing the Web as your PC, vendors are jumping to be the first to take you there. The browser that started it all, NCSA Mosaic, is still in the ring, but myriad second-generation packages have taken the basic concept of navigating the hypertext-linked servers that make up the Web and are turning it into an art form. Check in with us to see how far they've come173

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Desktop Scanners:
Color for All

BY ALFRED POOR Color desktop scanners are no longer expensive tools available only to graphics professionals. Thanks to the current crop of affordable units, ordinary business and home users can now add color to their documents and presentations. But color and black-and-white scanning capabilities vary widely. PC Magazine Labs tests 16 scanners, ranging in price from \$699 to \$3,499, to see how the less expensive units stack up against the pricey alternatives.....199

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The Bigger Backup

BY M. DAVID STONE

Today's hefty hard disks demand hefty backup solutions. But few people take the time to back up their important data routinely. The newest generation of tape drives offers affordable solutions and software that's easy to use. We review six minicartridge tape drives that offer capacities up to 680MB or even 1.3GB per cartridge.....237

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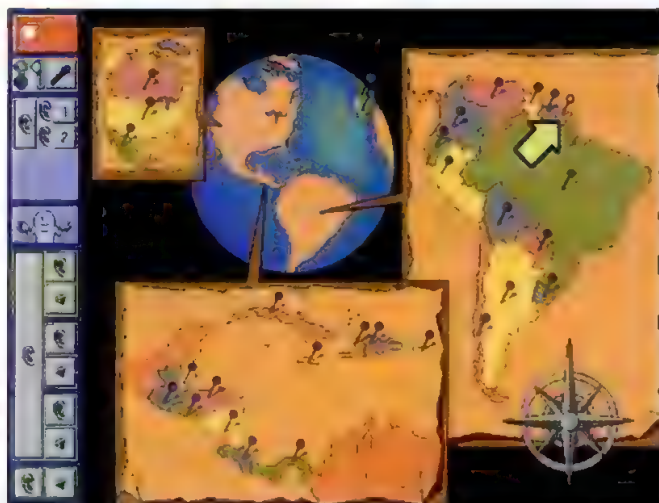
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Learn to speak Spanish in the comfort of your den (page 377).





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PC Magazine Reviews

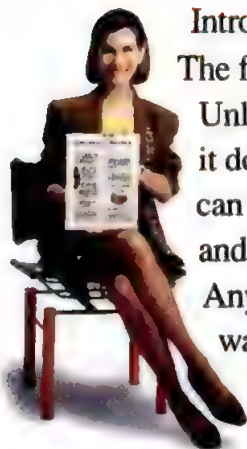
Except where noted: All *PC Magazine* reviews are of currently available products. Benchmark and performance tests are run on Compaq Deskpro 486/33M's.

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The network suite vs. the stand-alone suite.

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Complete integration vs. partial integration.

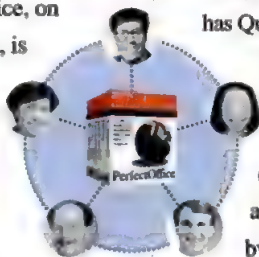
The programs in PerfectOffice have a consistent

interface. So do the programs in Microsoft Office. But PerfectOffice uses more common code and components, reducing system requirements. Plus, it supports Windows technologies like OLE 2.0 in more programs than Microsoft Office. Irony, isn't it?

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	PerfectOffice 3.0 Standard Edition	Microsoft Office 4.2 Standard Edition
Programs have consistent interfaces	YES	YES
Integrated E-mail, calendaring and scheduling**	YES	NO
Workgroup publishing features	YES	NO
Number of applications with OLE 2.0 support	Four	Three
Number of applications with on-the-fly spell checking	Three	One
Automated tasks that work independent of applications	YES	NO
Grammar checker can rewrite entire sentences	YES	NO
Intelligent find and replace	YES	NO
Ability to record scripts (macros) across applications	YES	NO
Supports both Visual Basic & AppWare programming tools	YES	NO
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Letters

ISDN ON THE LINE

As the ISDN product manager for a major computer systems company, I concur that ISDN deployment is a frustrating task ("Betting on the Dream," October 25, 1994). While our ISDN networking products are quickly gaining popularity in other parts of the world, our domestic service is spotty. Still, ISDN is ready to go, and bandwidth requirements for home use of on-line services and the World-Wide Web demand its use today. In truth, the answer does not have to be ISDN; any high-bandwidth solution that works is fine. But at the moment, do we have any other real choices aside from ISDN?

*John Talbott
via the Internet*

John C. Dvorak's scathing attack on the regional Bell operating companies in his sidebar "One Man's ISDN Travails" (October 25, 1994) was highly justified. I would point out, however, that US West is far from being the only carrier at fault here. The list of offenders is a lengthy one, and with the exception of Bell Atlantic, Pacific Bell, and perhaps a few others, nationwide deployment of ISDN has been very limited indeed. Please continue to complain long and loudly about the state of ISDN service.

*John Clark
via the Internet*

Keep in mind that the regional Bell operating companies are very unfocused these days—a result of the potential deregulation of local service. The Baby Bells seem rather freaked at the prospect of local competition, and are therefore focusing on the wrong targets.

*Russ Bell
via the Internet*

Your article on ISDN was interesting and factual. Articles such as this are of obvious importance to vendors, but they are also extremely helpful to end users, for whom ISDN offers a significant cost advantage. With vendors working hard to agree on standards, users will soon be



*ISDN is ready to go today,
and bandwidth needs for the
home demand its use.*

able to select products from vendors that provide the best price/performance and be confident that these products will work together.

*Rodney G. Wilson
via the Internet*

Thanks for your extensive look at ISDN. It's a pleasant change to read an article about ISDN that is written by people who actually use it.

*James Larus
via the Internet*

BLOATED EVER AFTER

Bill Machrone does the industry a service when he inveighs against top-heavy programming ("Code Bloat: The Ugly Truth," October 11, 1994). Pockets of resistance against the practice do exist. And for what it's worth, the industry only perpetuates the problem when publications use graphs to compare perceived—as opposed to measurable—program speeds. It's easy to see the pattern of what happens next: To move their product up in the standings, programmers hit the speed switch, unroll some loops, and shave a few milliseconds off the running time. In the process, of course, the size of the exe-

cutable is substantially increased, while the user—in the end—gains nothing.

*Beck Zaratian
Seattle, Washington*

Machrone has correctly identified the trend. Programs just keep gobbling up more computer resources. The main reason a compiler can be a hindrance is that its tools are designed to shorten a new product's time to market, not to meet users' desires and performance needs. Compilers are designed in the best interest of the developers—not the customers.

*Mark Bratcher
via PC MagNet*

Application code will continue to get larger because of market pressure and the simple fact that hardware components are now cheaper than ever. You can't expect to get smarter, more advanced applications without paying a price somewhere along the line; nothing comes for free!

*Randy Klamfoth
via the Internet*

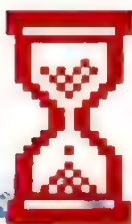
All I can say in response to Machrone's column is this: It's comforting to know I'm not the only one disgusted with bloated code.

*Dale Torgerson
via the Internet*

Machrone's polemic on code bloat defines the correct symptoms but totally misses the diagnosis, placing misdirected blame on developers. In the lean and mean 1990s, management wants more for less—and of course, the time-consuming thought process is what is being scaled back. Today's developers are less likely to know of strategies that promote code reduction and efficiency, which is sad, for like the slide rule, tight code may prove to be tomorrow's dinosaur.

*David J. Stifel
via the Internet*

Machrone should be heaped with praise for his column. Sometimes I feel as though I'm the only programmer who feels the same



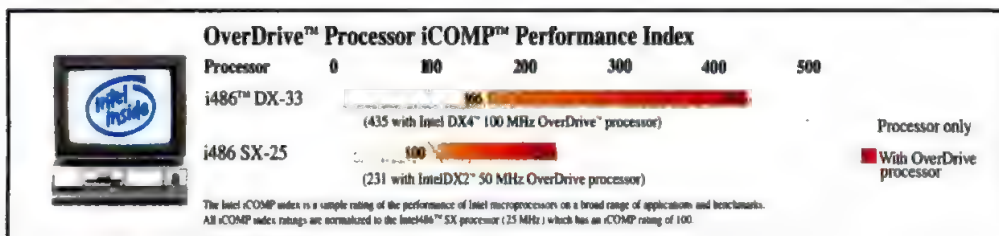
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LETTERS

way he does. We can only hope others will keep his article in mind before they write a program of oversize proportions.

*Eric Huss
via the Internet*

The biggest enemy facing programmers these days is time—time to learn the systems they're using and time to do things right. When faced with an impossible deadline, programmers are not worried about code bloat or the amount of resources a program needs. These concerns can be left for the rewrite, which almost never gets done, as there is always another impossible deadline looming on the horizon.

*David M. Keber
via the Internet*

Most of today's programmers don't have the experience with different types of hardware, operating systems, and languages they need to find the shortcuts and the neat solutions. What's more, there's no penalty for bad coding, which only perpetuates the problem.

*Ron Buck
via PC MagNet*

Programmers have become lazy and sloppy. They seem to believe that there are no limits in programming. Though they are right to a point, if all software manufacturers start thinking like this, a 1-gigabyte hard disk and 32 megabytes of RAM will become the standard as applications grow larger and larger.

*Adam Szymczak
via the Internet*

SECURE—ARE YOU SURE?

The Tutor column "How Secure Is Encrypted Data?" (October 25, 1994) describes the protracted process Jeff Prosis experienced while determining whether his more secure version of WinCrypt could be posted on CompuServe. That he even had to go through this process exposes a troubling weakness in this country's attempt to limit the export of "sensitive" resources—particularly software. Computer programs are as much a form of expression as any book is. Any attempt

to limit their export imposes a limit on speech that is in violation of the First Amendment. Although it's certainly a travesty that Prosis's program won't be seen, I worry more about the implications of government regulations that would prevent him from publishing the source code in the first place.

*Wayne Reses
Philadelphia, Pennsylvania*

The truly appalling effects of bureaucratic decisions that affect the computer industry and users must gain more attention. Prosis's self-imposed censorship of the more secure version of his encryption program reflects the dire need for a change in government policy.

*R. Geoffrey Newbury
Toronto, Ontario, Canada*

CREATING A NEW BREED OF CRIMINAL

John C. Dvorak misplaces blame for his alleged copyright faux pas on outdated copyright laws ("Are You an Electronic Criminal?", October 25, 1994). I'd rather blame outdated technology. There should be no need to attach a document that is

available on the Internet. Regardless of the e-mail service, messages should be able to include a low-bandwidth button or an HTML-style link to the original. It would then be up to the recipient of the note to decide whether to follow the thread with a single keystroke or mouse click—and then choose whether to observe current laws.

*Danny Goodman
via the Internet*

Dvorak isn't an electronic criminal. The move to tighten the copyright law is being made, in part, to prevent large database purveyors from selling articles they haven't been authorized by copyright holders to sell.

*Eric Hammel
via the Internet*

AN AUDIO TOUCH

Thanks for the great article "Adding Audio to Your Windows Database Interface" (October 25, 1994). I can't explain how I felt when my database said its first words.

*Anthony Alvarez
via PC MagNet*

CORRECTIONS AND AMPLIFICATIONS

In our Pentium and 486 Buyers' Guide ("For Love or Money," December 6, 1994), Acer America Corp.'s Service & Reliability score for customer satisfaction with technical support should have been *average*. In fact, in our latest Service & Reliability survey (January 10, 1995), Acer's grade on our Readers' Report Card improved to a B—up from a C on the previous survey.

In the Power Consumption table on page 152 of *PC Magazine's* annual printer issue (November 22, 1994), we mistakenly switched two columns of data for all products except the Xerox 4900 Color Laser Printer. The data in the column labeled "Power consumption when printing (watts)" actually belongs in the column marked "Power consumption at rest (watts)"—and vice versa. The data for the Xerox 4900 Color Laser Printer is correct.

The correct toll-free number for Coriolis Group Books, publisher of *Inside the*

PowerPC Revolution (Read Only, December 20, 1994), is 800-410-0192.

The price for the Digital HiNote CT475, reviewed in "Six Notebooks That Push the Status Quo" (First Looks, January 24, 1995), should have been \$4,698 for the tested configuration with 8MB of RAM. The \$4,399 price given in the review is for a configuration with 4MB of RAM.

HOW TO WRITE TO PC MAGAZINE

We welcome your comments and suggestions. Please send correspondence to Letters, *PC Magazine*, One Park Ave., New York, NY 10016-5802. You can send electronic mail via the Internet at 157.9301@mcimail.com, or you can upload it to PC MagNet (see page 12 for access information). You can also send e-mail to individual editors. Type GO PCMSTAFF on ZiffNet for a list of addresses. All letters become the property of *PC Magazine* and are subject to editing.



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Meridian 800 with unretouched photo of active matrix display.

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486DX2-50	\$2695	\$3095	486DX2-50	\$2995	\$3295	486DX2-50	\$3295	\$3595
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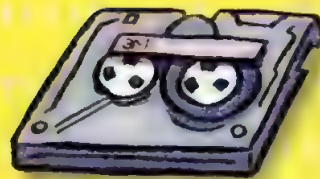
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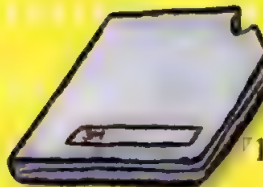
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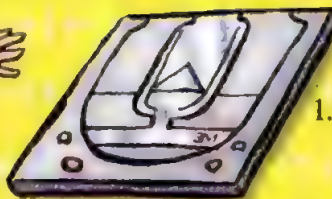
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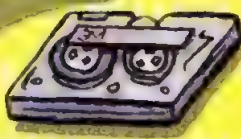
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Trends

TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

The Pentium That Stole Christmas

At the height of the holiday shopping season, the confidence of computer users everywhere was shaken by the discovery of a flaw in Intel's Pentium chip that caused the processor to produce errors involving certain division calculations. The public-relations nightmare quickly turned into a shooting match between Intel, which was caught up in spin

control, and IBM, co-developer of the PowerPC chip, a Pentium competitor. While Intel defended its position not to recall the flawed chips, IBM suspended sales of its Pentium systems, claiming that Intel vastly underestimated the impact the defect could have. Intel later offered to replace the chips.

News of the defect, discovered by math professor Thomas Nicely and posted on the

Internet, was picked up by the press and quickly hit Wall Street. Meanwhile, Pentium owners got angry when Intel said it had been aware of the flaw since the summer. And they got confused when Intel and IBM battled over how frequently an error would occur and which kinds of PC users should worry about the defect. Intel opened a hot line, PC makers offered replacement chips, and

Pentium tests and fixes flooded the Internet.

In this issue of Trends, editor-in-chief Michael J. Miller analyzes the Intel imbroglio, and we tell you where to find utilities on the Internet to test your Pentium, what happens when you call Intel's hot line, how much a recall would cost Intel to, and why no chip can ever really be perfect.—Carol Levin



Intel or IBM: Who Do You Trust?

THE PENTIUM AFFAIR HAS TURNED into a comedy of errors, but for anyone who has run into the processor's division error, it's anything but a laughing matter.

The Pentium is not the first chip to have a defect. Processors are so complex that it's virtually impossible to make them perfect. In fact, the first version of the Intel 386 had a math flaw that Intel quickly fixed without causing much of a stir. This isn't the first glitch for the Pentium, either. The first Intel-based companion chip sets for the Pentium didn't allow for write-back CPU caching.

This time, though, the stakes are higher. Intel's growing visibility makes it a name customers recognize, not just one of several component vendors.

If Intel had just acknowledged the problem when it first discovered the anomaly last summer, and if it had offered to replace the chips, the issue could have been a minor one. But Intel compound-

ed the problem by coming up with the most optimistic projection of how often customers would come across the error.

BAD MATH ALL AROUND

The flaw is caused by a problem with a lookup table used by the Pentium when performing division. Errors show up in the 4th through 15th significant decimal digits. This means that in a result such as 1.234567, the last three digits could be wrong.

Just who will encounter the defect, and under what circumstances, is the focus of much debate. Intel said the problem shows

up in one out of every 9 billion situations in which you divide one number by another. Intel came up with the projection that a basic spreadsheet user would come across the problem only once every 27,000 years. The projection didn't reassure customers who actually encountered problems.



Michael J. Miller
analyzes the
Pentium affair.

Then math problems started showing up in the press, problems such as the following:
 $(48.999999/41.999999) * 41.999999;$
 $4,195,835 - (4,195,835/3,145,727)$
 $* 3,145,727).$

Both produce wrong results. In the first example, the right answer is 48.999999. In the second example, the Pentium gives an answer of 256 (wrong) instead of 0 (right).

IBM then got into the game. It claimed that customers could run into the error once every 24 days. So IBM stopped shipment of its Pentium systems. IBM appeared to be the industry watchdog, taking the moral high ground and doing right by customers.

The story gets more complicated, though. IBM wasn't selling many Pentium-based machines anyway, concentrating instead on 486 machines and making plans to produce chips for Intel's competitors. And don't forget that IBM is also backing the PowerPC as an alternative to the Pentium and is producing NexGen's Pentium alternative at IBM's plant in Burlington, Vermont, as well as Cyrix's upcoming M1 Pentium-class chip.

Pipeline By Robin Raskin

Pentium Means Having to Say You're Sorry

Like many of you, I had a good ol' time collecting Intel-bashing humor during that fateful week in November when the Pentium floating-point problem became big news. The timing couldn't have been worse for Intel: pre-holiday shopping in full swing, Pentiums at the sub-\$2,000 mark—and all of a sudden the chip is the brunt of jokes that even the most mathematically challenged could sink their teeth into.

A couple of personal favorites:



Q: How many Pentium designers does it take to screw in a light bulb?

A: 1.99904274017, but that's close enough for non-technical people.

Q: Why didn't Intel call the Pentium the 586?

A: Because they added 486 and 100 on the first Pentium and got 585.999983605.

But if you stop and think about it, this chip has been a source of constant embarrassment to Intel, even before day one. Here's a recap of worst moments in the life of the Pentium:

#1: The Name. How much did Intel have to pay someone to take a nice understandable code name like P5 and turn it into Pentium? Surely you remember the Sexium jokes, don't you?

#2: The Delay. Once the chip was named appropriately, the wait began. The Pentium, scheduled for release at the end of 1992, showed up in 1993. Of course, Intel apologized for the

delay, stating that the reason was to avoid the customer-found bugs that hurt the launch of the 386 and 486 chips.

#3: The Performance. The Pentium architecture is different enough from its predecessors to warrant a recompile of operating systems and applications so that they can take advantage of its superscalar design. The recompile is not a trivial task, and many developers choose to forgo it and simply not take advantage of the Pentium's capabilities.

#4: The Faulty BIOS. Last August, Intel acknowledged that it had recommended a faulty BIOS setting to manufacturers, causing problems with their PCI 90-MHz systems. Granted, Intel took the heat for this one graciously, since some of the problems appeared to stem from aggressive PCI chip set vendors trying to eke a bit more performance out of the systems. A BIOS update and a few apologies sent the Pentium back on its way.

#5: The Heat. The heat dissipation in Pentium machines has been another source of hellish jokes. While the 3.3-volt chip has nearly remedied the problem, the Pentium is still thought of as a way to bring the heating bill down in many offices and homes.

#6: The FPU. I don't have to tell you that it's been like taking a refresher course in math, but certainly the FPU bug is the Pentium's biggest faux pas to date. The chip's credibility is shot within the scientific community, and the fact that the flaw was covered up for months doesn't help matters.

Is it all over for the Pentium? Doubtful. Intel has shipped at least 2 million of the chips, and as prices continue to drop, many people will take the calculated plunge. The three P's, performance, price, and promotion, have always been Intel's strong suits. But as any good MBA student will tell you, the fourth "P" had better stand for product or you'll spend a good deal of your time apologizing.

Robin Raskin is the editor of PC Magazine.

IBM's theory revolves around the idea of "bruised integers"—numbers that appear in a spreadsheet as a typical integer, but actually are subject to the error more frequently. For instance, if you do $4 - 1$ in a spreadsheet, you get exactly 3 on-screen (represented in the computer as 1.100000000 times 2 to the power of 1) because both 4 and 1 can be represented exactly in binary. If you do $4.3 - 1.3$, though, you get 3 on screen but the result in the computer is "bruised" (1.011111111 times 2 to the power of 1) because neither number can be represented exactly. It is then more likely to cause an error if it's subsequently used in a divide. As a result, IBM calculated that the kind of divisors causing the problem were 90 times more likely to occur in calculations than Intel originally had figured.

It turns out that IBM's calculations were open to criticism as well. IBM based its analysis on a customer who ran CPU-intensive calculations on a 90-MHz Pentium for 15 minutes of CPU time every day. This is

actually quite a lot because the Pentium performs millions of calculations per second.

A similar analysis by Tim Coe, a chip designer at Vitesse Semiconductor, looks at the problem from another angle. He reverse-engineered the offending divide unit by identifying significant recurring patterns in the chip's miscalculations. He found that when you take any of five integers—3, 9, 15, 21, or

27—multiply it by any power of 2, and then subtract a tiny increment, the resulting number can produce errors when used as

the denominator in division equations involving five or more significant digits. Two numbers he arrived at this way are 35.9999999 ($9 * 4 - .0000001$), and 41.9999999 ($21 * 2 - .0000001$).

So who's right, IBM or Intel? The answer seems to be neither. IBM was overstating the problem and Intel was understating it.

An analysis by Ed Henning of PC Labs U.K., working with Nick Stam of PC Labs U.S. and others, gives another view. If you

take Intel's projection of one error in 9 billion division operations, look at the likely number of divides executed in intensive spreadsheet work, and then factor in 5 minutes of floating-point calculation every day, a fairly intensive spreadsheet user would come across the error once every 21 years on a 75-MHz Pentium.

If you take the more frequent suspect divisors used by IBM and factor in 15 minutes of floating-point time, you get an error about once every 28 days. But an analysis from Peter Coffee of PC Week Labs indicates that IBM didn't take into account that even with some suspect divisors, the chip will come up with the right answer. Coffee calculated an average, based on 5 minutes of CPU cycles, of about one error every 10 years for intensive spreadsheet users.

Of course, all of these calculations of the time between errors add up to statistical nonsense for most people. The Pentium flaw

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doesn't produce *random* errors. It's a very distinct, very repeatable error in the chip. If you're doing calculations where multiple digits of accuracy are important, and if you're using the results of cumulative calculations where the numbers change constantly by a small amount, you're extremely likely to run into the divide problem. Otherwise, you're unlikely to encounter the flaw no matter how long you wait.

Most consumers aren't at risk because the kinds of things they use their computers for—writing letters, sending e-mail, playing games, and creating mailing lists—don't use floating-point math at all. Even if you're doing a budget at home, you're likely to work with integers, just as most business-spreadsheet users do.

If you're doing math, scientific, or engineering calculations, however, you're much more likely to run into the floating-point defect. And if you're working with lots of numbers that change very frequently, such as fast-changing interest rates or derivatives, then watch out. We heard from one business that reran its 1994 results on a 486 and found an error in the millions of dollars.

If you're doing calculations where multiple significant digits of data are crucial, you should use either a different chip or a utility that checks for the problem and intercepts it. You'll find some of these available on-line, although such utilities by definition will slow down your calculations. By all means, call Intel's hot line at 800-628-8686 or your PC vendor and ask for a replacement Pentium.

MORE LOSERS THAN WINNERS

The rest of us should just sit back and watch the show, which so far has yielded more losers than winners. The clearest winners are Apple and the PowerPC consortium because they're the up-and-coming Pentium alternative. AMD, Cyrix, and NexGen win as well because the door for competition now swings open a little wider. But they would have won much bigger if all these Pentium-class chips had been ready for shipment.

Intel has lost its aura of invincibility and any perception that its chips were more reliable than other choices. IBM has lost because instead of coming off as a good Samaritan, it looks like an opportunist. Most system vendors have lost because the whole affair has confused many PC buyers and scared them into delaying purchases. Users who do complex work have lost because they'll have to double-check their results. And mainstream PC users have lost because they're worrying about problems they'll never see.—Michael J. Miller

What Happens when You Call Intel? Who Else Can You Call?

After the first tumultuous weeks of the Pentium crisis, Intel finally decided to replace Pentium chips on demand; it's even setting up service centers to help the timid swap their chips. But even before its change of heart, our experiences in getting information and replacement chips from Intel were pretty good, despite rumors that some chalk-covered math guru would make you prove that you really needed the chip fix. As the weeks go on, we expect Intel to continue its campaign to reestablish consumer confidence

in the Pentium chip
and to pick up
speed in supplying
quantities of re-
placement chips.

Our anonymous calls to the
company's support
line (800-628-
8686), after Intel
admitted the flaw,
went better than anticipated. On a typical
call, we were on hold for 40 seconds. The
support person then promised us a
replacement without asking a single ques-
tion about applications, asked for an ad-
dress, phone number, and credit card
number in case the old chip wasn't
returned, and said a new chip would
arrive in 4 to 5 weeks.

Meanwhile, Intel and others have
come up with software solutions for the
Pentium problem. Cleve Moler of
Mathworks in Natick, Massachusetts,
and Tim Coe of Vitesse Semiconductor
in Camarillo, California, have worked
with Intel to develop a software-based
detour for the internal functions of the
Pentium's floating-point unit that con-
tribute to miscalculations: Divide,
Remainder, Tangent, and ArcTangent.

After determining that the chip in ques-
tion has the FPU flaw, the detour
reroutes calculations that are dependent
on the four functions above to macros.

The detour results in a speed hit when
performing calculations dependent on
those four functions, but it doesn't result
in a speed hit for all calculations that use
the floating-point unit. Other detours
work by completely avoiding the whole
floating-point unit.

The catch: Applications have to be
recompiled in order to incorporate the
software fix that Moler, Coe, and Intel
have developed. Microsoft, Watcom,
Borland, Symantec, and other compiler
vendors have already incorporated the fix
into their development tools. They'll also
work with current users of their products
who want access to the fix. Moler plans to
post the fix on the Internet, and you can
get more details at Mathworks' home
page on the World-Wide Web (www.mathworks.com).

Is a software
solution out of the
question if you
don't want to wait
for recompiled
applications? No,
but solutions that
avoid using all or
part of the float-
ing-point unit are
likely to compro-

mise speed. Lotus sent us a detour around
the FPU's flaw for users of Lotus 1-2-3 for
DOS 2.4, 3.4, and 4.0, and for users of 1-2-
3 for Windows 4.0, 4.01, and 5.0. In the
DOS versions of 1-2-3, you can avoid the
error by starting 1-2-3 from the DOS
command line and adding the switch "-s,"
which will cause 1-2-3 to use its own float-
ing-point software for calculations. To set
this switch in 1-2-3 for Windows, highlight
the 1-2-3 icon in the Program Manager
and select File Properties. The dialog box
that's displayed contains a Command
Line field with a path to 1-2-3. After the
last character in the path, add "[space]-s"
and choose OK.

Other vendors have been mum about
how they'll approach fixes for current
applications, though most plan to com-
pile fixes into their upcoming versions.

Microsoft has an interim fix for Excel
users that's very similar to the Lotus fix.
Excel users can call Microsoft technical
support (206-635-7070) and get a disk
that will check whether their chip is
flawed. If it detects a flaw, it will detour
math calculations away from the float-
ing-point unit. One thing's for sure: No
matter what kind of software detour you
choose, some or all of your calculations
will slow down.—Sebastian Rupley

*No matter what kind of
software detour you
choose, your calculations
will slow down.*

When Good Chips Go Bad

ARE MICROPROCESSORS GETTING so complex you can't depend on them? Yes, says Thomas Nicely, the math professor at Virginia's Lynchburg College who first publicized the Intel Pentium chip's flaw in calculating certain division equations. The error is fixed in chips scheduled to ship early this year, but users remain angry and confused. According to Nicely, "The current generation of microprocessors has become so complex that it's no longer possible to completely debug one." Indeed, Intel ran the Pentium through more than 10 billion tests on multiple platforms before its release.

Les Kohn, chief architect of Sun Microsystems' UltraSPARC chip—which has 5.2 million transistors compared to the Pentium's 3.1 million—says, "Ten years ago, testing a chip meant running a few million test cases designed to trip the chip up, and it now means running more than 10 billion."

Here's the best evidence of how hard it is to catch a significant flaw: It took nearly two years and the shipment of over 2 million

THE PENTIUM PAPERS: WHERE TO GO ON-LINE



- ▶ PC Magazine Labs, PC Magazine Labs U.K., and PC Week Labs prepared a Q&A you can read at *PC Magazine's* home page on the World-Wide Web at <http://www.pcmag.ziff.com/~pcmag>. You'll also find a utility for testing your system. FTP to <ftp://ftp.pcmag.ziff.com/pub/pcmag/special/pentst.zip>. From CompuServe, you can go to the PC Labs section of the Utilities Forum on ZiffNet; GO ZNT:UTILFORUM, Library: Labs, File: pentst.zip
- ▶ The *PC Week* home page at <http://www.pcweek.ziff.com/~pcweek> has a white paper and a DOS program showing results of PC Week Labs testing. You can also download the file from <ftp://www.ziff.com/pub/pcweek/fdv/fdv.zip> or from CompuServe. GO ZNT:PCWEEK, Library: Labs/Netweek, File: fdv.zip.
- ▶ Intel's home page at <http://www.intel.com> has a software fix as well as statements from Intel CEO Andy Grove.
- ▶ MathWorks' home page at <http://www.mathworks.com> has a software fix.
- ▶ IBM has a study on the likelihood of an error. E-mail to ibmstudy@watson.ibm.com or <http://www.ibm.com>.
- ▶ For the PentiumBug FAQ (frequently asked questions) by Mike Carlton, University of Southern California, FTP to [www.isi.edu, in /pub/carlton/pentium/FAQ](ftp://www.isi.edu/in/pub/carlton/pentium/FAQ).

Pentium systems before any user uncovered the chip's math problems. The flaw is the result of a simple error in translation between two generations of chips. The error occurs in the part of the chip's floating-point unit that handles division.

Ironically, the Pentium's divide unit was inherited from the dependable 486 chip. Intel says the culprit was a single omission in a lookup table the Pentium uses when doing division. The error was

introduced during the transfer of the divide unit.

Flaws have occurred in other microprocessors (including Intel's own 386 and 486 chips), but now the stakes have risen. While Intel has positioned the Pentium as both the PC chip of choice and a workstation-chip killer, those workstation users who opted for lower-cost Pentium systems are most likely to encounter the glitch. —Sebastian Rupley

■ The Cost of a Recall: Crunching the Numbers on Intel's Bottom Line

Intel is replacing Pentium chips, but how expensive would it have been to recall all the chips in the first place?

Dataquest's market research cites 4 million Pentium systems shipped as of the end of 1994. *Microprocessor Report* estimates the manufacturing cost to Intel for replacement chips at \$150 per chip, and factors in a \$100-per-chip cost for shipping and upgrade services. Based on these numbers, the cost to Intel for a total recall would have been \$1 billion.

This billion dollar estimate is deliberately conservative. It ignores what probably would have been the greatest cost of all if Intel had recalled all 4 million Pentium chips: the loss of substantial revenues from not producing more chips while producing all of the replacement chips. In other words, the cost to Intel of slowing down or halting the production of new chips easily could be greater than the cost of producing and replacing the flawed chips.

Is a high-flying company like Intel rich enough that it simply could have covered a billion-dollar charge in cash? Yes. According to the Value Line Investment Survey, Intel had



over \$3 billion in cash at the end of 1994. But it's also telling to compare the billion-dollar charge to Intel's annual earnings. Reuter's Money Network, which uses financial data from Standard and Poor's, estimates Intel's total annual earnings for 1994 at just over \$2.4 billion.

By comparing the \$1 billion cost of a total recall to the \$2.4 billion earnings figure, we see that a total recall would have cost almost

50 percent of Intel's total 1994 earnings. The dramatic hit on profits comes about because a substantial part of the profit margin for a chip manufacturer comes from its high-end, high-margin products.

The old axiom says that chips double in power every 18 months. A chip manufacturer has to put a big part of what it earns toward its next, more powerful product. When Intel decided not to recall the Pentium, its chip engineers and scientists quickly forwarded irrelevant numbers (indicating that random errors occur once every 27,000 years). Were accountants and MBAs crunching the relevant ones?

—Sebastian Rupley

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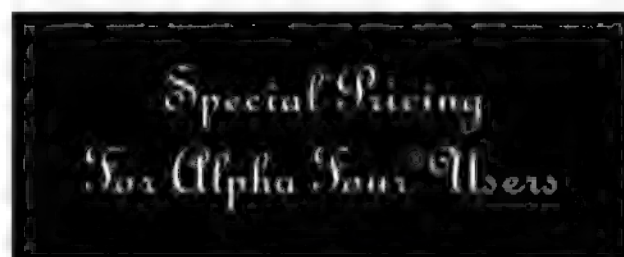
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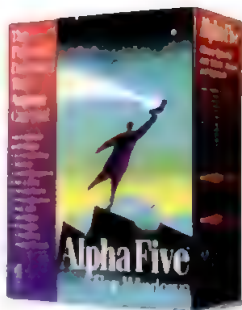
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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

■ Internet Access

Two Browsers That Give You Internet Eyes

BY RICK AYRE

With the Internet rapidly becoming a global PC community, novice and expert users alike are looking for easier and more flexible ways to connect. Two of the most recent entrants in the Internet-browser market demonstrate that ease of use is now key.

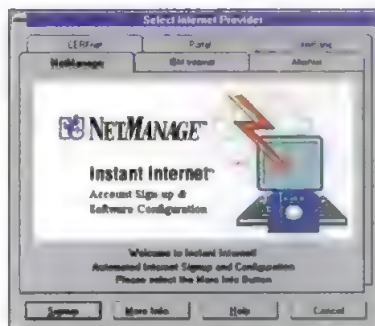
NetManage's Internet Chameleon offers a one-step Internet account for first-timers and Net aficionados. Frontier's SuperTCP Pro sacrifices some ease of use for power, but it's

one of the best-integrated Internet packages and one of the first non-Unix packages to support X windows sessions.

While Chameleon and SuperTCP Pro have two different approaches to how to navigate through the nooks and crannies of the Internet, each package offers more connection choices.

NETMANAGE INTERNET CHAMELEON 4.1

The Internet Chameleon from NetManage is probably the most



QUICK WAY: NetManage's Chameleon includes Instant Internet, which lets you choose a service provider, and then takes care of signing you up.

popular way for Windows users to connect to the Internet. That's because Chameleon Sampler is an easy-to-use Internet browser that is included with any number of books (including *Internet for Dummies*) or book-software packages (including *Internet Sign Up Kit*). Internet Chameleon 4.1, the latest program from NetManage, should appeal to two audiences: new users who want a quick connection

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■ Presentations

Aldus Persuasion Makes Multimedia Work

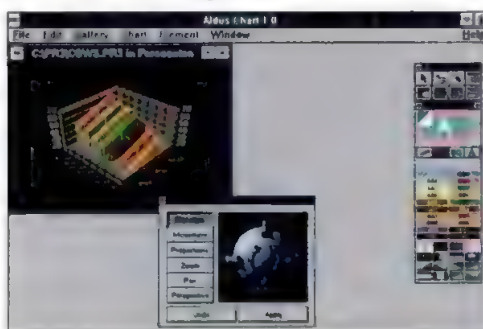
BY DAVID HASKIN

The hotly competitive presentation graphics market has branched into two increasingly divergent segments. Products such as Microsoft PowerPoint excel at walking occasional users through the process of developing presentations; programs such as Gold Disk's Astound simplify the creation of sophisticated multimedia presentations—but provide little help for the uninitiated.

The \$495 Aldus Persuasion 3.0 for Windows package takes a determinedly middle-of-the-road approach—one that should appeal to users who are frustrated by the abundance or absence of hand-holding in current programs. Despite the recent acquisition of Aldus by Adobe, the product will

keep the Aldus moniker, yet be part of Adobe's growing software presence.

Where does Persuasion 3.0 fit in? While it has nothing equivalent to PowerPoint's Wizards for helping users wade through complicated procedures, Persuasion 3.0 has more multimedia muscle. Yet those multimedia capabilities still fall short of Astound's extensive class-leading features.



DATA SPIN: Persuasion's charting module includes the ability to change the rotation, shape, and other aspects of a chart.

DIFFERENCES INSIDE

From outward appearances, Persuasion 3.0 has a vastly improved interface that presents the program's full potential to the user. Persuasion 3.0 is similar to most presentation programs in that it provides three separate views: the slide view, the sorter view, and the outline view. As you would expect, text can be entered in the outliner and moved around by dragging and dropping. While you can check spelling in the outliner, you can't do much else.

By contrast, Persuasion 3.0's slide view is very flexible and powerful. By using the program's automated templates, we were able to select from among different pre-formatted slide styles, each of which includes frames for items such as charts and text.

To add text, first click on the text icon in the toolbar, then click on the place in the slide where the words go. A window will open, allowing you to add the text. While this window provides basic formatting options, Persuasion 3.0 doesn't have

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Internet Browsers

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tion to the Internet and Chameleon fans interested in upgrading.

NetManage has added a quick start-up program called Instant Internet, a one-button connect option that is today's easiest way to get on-line. Instant Internet appears as an icon in your Net-Manager group when you install Chameleon. Just click on it and a tabbed dialog box appears with the logos of several connection service providers, including Alternet, CERFnet, IBM Internet, InterRamp from PSINet, and Portal.

Once a service provider has been selected and billing information has been entered, Chameleon does the dirty work of signing you up. We tried signing up for InterRamp and found it was a snap. After we filled out the on-screen forms and went on-line, Instant Internet not only established our account but put all the data we needed for future log-ons into the appropriate fields in the Chameleon programs. It couldn't have been easier.

The big advantage of all this is simplicity. You can forget about IP addresses, passwords (although you can change these any time you want), and even the telephone numbers for the call-in connection site that is closest to you. Chameleon does it all and does it well. All of the technical details are handled for you, which makes getting start-

FRONTIER SUPERTCP PRO

Frontier's SuperTCP Pro provides a multitude of new features that will appeal to novices, and other features aimed at power users. In fact, SuperTCP Pro has so many new features, it comes on a CD-ROM and floppy disk.

Frontier completely revamped SuperTCP Pro's install program to make it quicker and

easier. Internet wannabes and neophytes can get up and running without having to become networking experts, yet the program is flexible enough that power users can customize to their hearts' content. We think the package meets the very different expectations of both users. But because it is not linked directly to specific service providers, the program is not quite as easy as Netmanage's

high-end package as well, which makes it the most integrated Internet program around.

In addition to the expected Internet tools, such as e-mail, a news reader, and WinTapestry, there is also support for NFS (client and server) and a full 32-bit X server (this multitude of tools requires packaging the program on a CD-ROM). X server support is not for everyone because it requires the use of the Windows NT operating system. SuperTCP Pro provides X window networking support, and the ability to attach to X clients and support Unix X window sessions on your Intel-based PC.

Frontier was the first to deliver TCP/IP under Windows as a DLL, and the first to do it as a VxD; now it takes the lead in resolving the conflicts between power and ease of use. The only aspect of this powerful program that gives us pause is its price. At \$595, SuperTCP Pro may be out of the reach of many users interested in an occasional exploration of the Internet. On the other hand, the package includes a lot of features for the money.

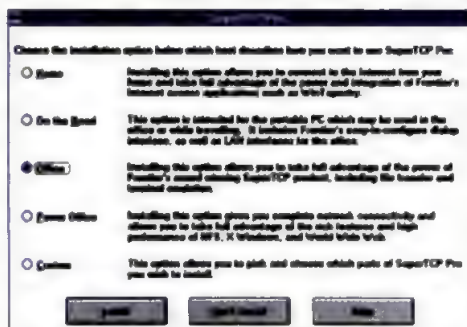
If all you want is basic access to the Internet, you can ignore some of the more sophisticated portions of SuperTCP Pro. But if you need a full Internet toolkit, you won't be disappointed with the ones Frontier provides.

► **Internet Chameleon 4.1.** List price: \$199. Requires: 4MB RAM, 5MB hard disk space, modem (14.4 Kbps or faster recommended), Microsoft Windows 3.1 or later, Net-Manager Inc., Cupertino, CA; 408-973-7171; fax, 408-257-6405; e-mail: support@netmanager.com.

Circle 432 on reader service card

► **SuperTCP Pro.** List price: \$595. Requires: 4MB RAM (16MB recommended), 30MB hard disk space, modem, Microsoft Windows 3.1 or later. Frontier Technologies Corp., Mequon, WI; 800-929-3054, 414-241-4555; fax, 414-241-7084; e-mail: supertcp@frontiertech.com.

Circle 433 on reader service card



NET GUIDE: SuperTCP Pro leads you through a typical installation, with many of the details handled for you.

ed as easy as registering a program.

Other additions to Chameleon make it a more thorough Internet program as well. Chameleon offers a well-designed, but not outstanding, Web browser, and a nice archie program. Both are complete but not very substantive. All told, Chameleon is now one of the best Internet access programs there is.

Instant Internet.

The big news is Frontier's WinTapestry. Much more than a Web browser, WinTapestry includes gopher, FTP, and telnet, along with an address book to keep your favorite watering holes on the Internet organized. WinTapestry was previously sold as part of the Super-Highway Access package, but now finds its way into Frontier's

■ SimuNet: Off-Line Introduction to the Internet

Have you been itching to get on the Internet but daunted by the sheer vastness of it all? Bridge Learning Systems (800-487-9868) may have the answer: the second edition of its Internet tutorial program called SimuNet. At \$19.95, this program allows you to test-drive the Internet before you actually go on-line.

SimuNet is a DOS-based simulation of the Internet based on James Potter's book *Bridging the Internet Gap*. SimuNet is extremely easy to use: Just follow the prompts and you're on your way through the program's seven tutorials. The first, "Introduction to the Internet," explains what the Internet is and how it evolved. This section includes useful definitions of basic terms as well as an explanation of Internet addressing conventions.

SimuNet's second tutorial shows you how

to create, send, and accept electronic mail over the Internet, and includes the useful tip of how to take your name off a mailing list to stem the flow of unwanted junk mail. The remaining SimuNet tutorials cover topics such as how to print, download, and upload files; how to use indexes including archie and World-Wide Web; and how to navigate your way around the Net using gopher. Each is easy to follow, and warns you ahead of time of any incompatibilities or differences in command protocols that you may encounter once you're actually on-line.

More than a static program, SimuNet offers updates from a gopher site at California State University, Hayward (instructions for accessing the site are included in the book).

—Carol Venezia

Persuasion 3.0

CONTINUED FROM PAGE 37

advanced typesetting capabilities such as pair kerning. The result can be occasional awkward-looking passages.

The slide view is also where you can add the charts, hyperlinks, multimedia objects, and tables that breathe life into a presentation. Persuasion 3.0 can be a bit confusing to use, however, because there isn't a single place in the interface for adding these elements. Rather, multimedia objects are added from a selection in the File menu, while charts, links, and tables are brought into a presentation via a two-step process: First, you click on the toolbar button corresponding to the type of object you want to add, then you draw a frame for each object by dragging the mouse across the slide. The program adds a small icon to each frame; clicking on this brings up fine-tuning options for that object.

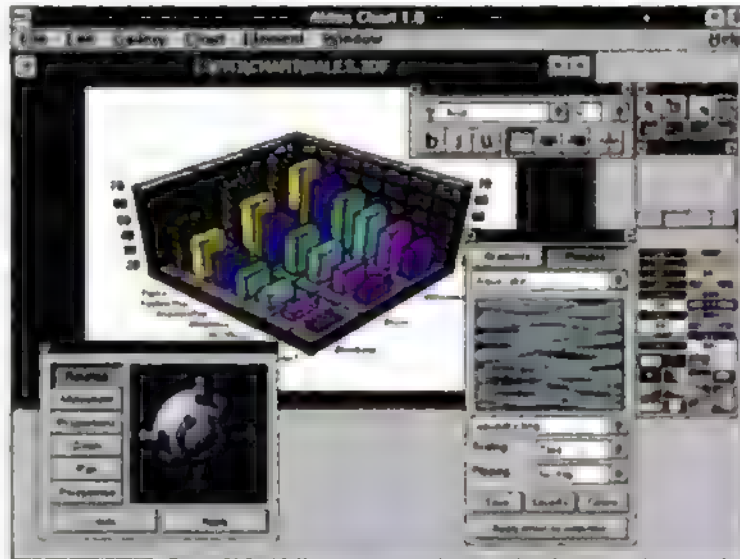
The enhanced charting capabilities within Persuasion 3.0 are impressive. The OLE-connected charting applet supports 84 different chart types—although its data sheet supports little more than basic math and statistical functions. Most users will continue to rely on spreadsheet and scientific programs to do the math (see "Charting Persuasion's Future").

Menu choices enable you to fine-tune a chart's appearance. For example, we were able to rotate a pie chart, then remove one of the pie's slices. Submenus allowed us to determine the extent of each effect, such as how far we wanted to separate the pie slice from the rest of the chart. A more powerful feature is the dialog box included in the charting module: It lets you specify effects like panning, zooming, and moving and reshaping 3-D charts. Each of these tasks is easily accom-

■ Charting Persuasion's Future

Persuasion's impressive Aldus Chart module has been seamlessly integrated into the package via OLE, giving users the power and flexibility of a standalone charting program.

In addition to floating spheres, pyramid bar charts, and shapes based on the bitmap image of your choice, there are 84 preset chart types. The program's 3-D View palette lets you fine-tune the position and size of the chart by dragging your cursor over a grid.



OPTIMIZE: The Aldus Chart module's robust set of chart tools includes the 3-D View palette for fine-tuning chart position and size.

Once perfected, you can save charts as templates on which to base any future charts you create—making it easy to develop a consistent corporate feel for presentations. The charting applet's only downside is its spreadsheet capabilities: While easy to use, they are pedestrian. You can, however, import ASCII, dBASE, Excel, and Lotus 1-2-3.—DH

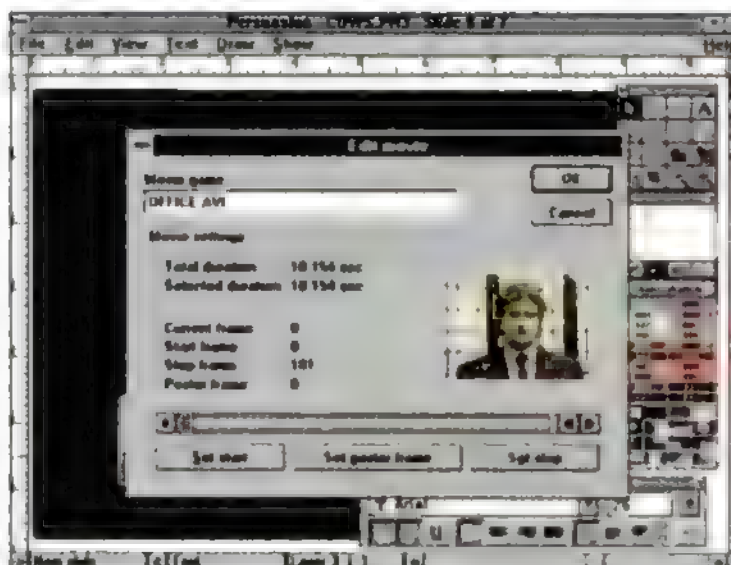
plished with your mouse, making it simple to create complicated effects.

While adequate for most presentation tasks, Persuasion 3.0's drawing capabilities aren't particularly powerful. They include basic vector drawing tools for arcs, circles, lines, squares, and freehand drawing. You change fill colors and patterns for all on-screen objects by clicking on editable palettes. Persuasion also has a useful new color trick: You can switch between color and grayscale modes instantaneously. The ability to maintain color and grayscale data in the same file simplifies the process of printing black and white slides for handouts and faxes.

THE POWER OF MOVEMENT

Persuasion 3.0 allows you to animate the entry and exit of on-screen objects so that, for example, bullet points enter from the left side of the screen and headlines from the right. This is a

powerful feature that allowed us to customize movement within our presentation. Still, Persuasion provides less control than Astound over the trajectory of entering and exiting objects, and



GO TO THE VIDEOTAPE: While Persuasion has built-in media players for items like videos, its ability to control these items is limited.

includes no advanced effects such as adding a bounce when the item stops on-screen.

Persuasion's newly improved multimedia abilities now include built-in media players that support most common formats, including QuickTime for Windows. In theory, built-in players make multimedia elements eas-

ier to add, manipulate, and play than using OLE links to external media players—but Persuasion's control over multimedia is a mixed bag. For example, the start and stop points for animation, music, and video clips can be set easily, but an audio clip's volume can't be controlled from within the program.

Nor is it easy to establish the behavior of one multimedia object in relation to others. That's because these relationships are established by assigning one or more objects to different layers of the slide. While layers make it easy to create simple effects, this method isn't flexible enough for timing multimedia objects that have varying run times. For this task, more multimedia-savvy programs use timelines that allow you to storyboard the action by precisely setting the starting and ending times for each object in relation to the other objects.

Hyperlinks are increasingly a key element for sophisticated on-screen presentations, and Persuasion's abilities are middle of the road. It is simple to create links that jump from one slide to another slide, another presentation, or an external program. With Persuasion, however, designating *hot spots*—specific words or places in a slide that serve as the starting point for a hyperlink jump—is an awkward process.

All told, Persuasion 3.0 is neither the simplest presentation package available nor the most powerful. But for those with moderate multimedia needs who don't want hand-holding, it is a powerful and flexible choice.

► **Aldus Persuasion 3.0 for Windows.** List price: \$495; upgrade, \$150. Requires: 4MB RAM, 16MB hard disk space (31MB for full installation), Microsoft Windows 3.1 or later. Adobe Systems Inc., Seattle, WA; 800-685-3617, 206-622-5500; fax, 206-386-8854.

Circle 405 on reader service card

Financial Management

Business Plan Pro: First Step for Start-Ups

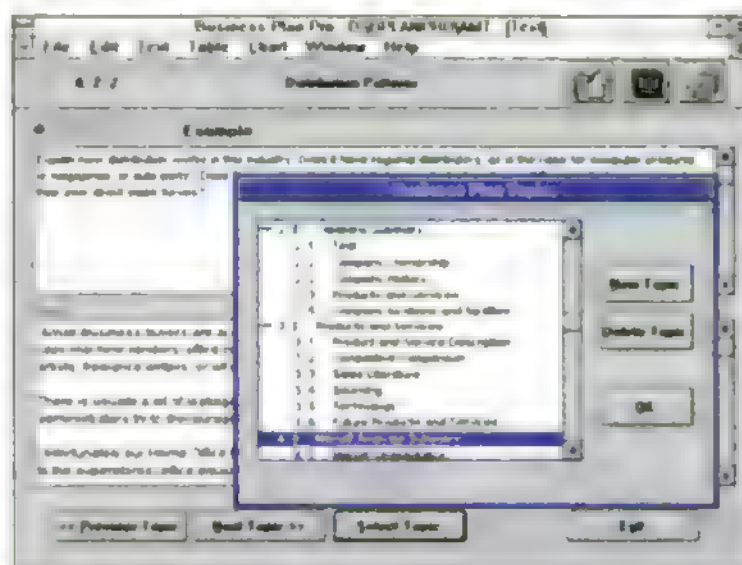
BY KATHY YAKAL

Business-plan software is a potentially good source for management advice and guidance when one is running or starting a business, but efforts so far have been disappointing. Palo Alto Software takes a step forward with its all-in-one Business Plan Pro (\$149.95), which walks you through the process of designing a credible and workable business plan. Its integration, flexibility, and navigational ease set new standards for this genre.

A realistic business plan requires numerous pages of text outlining such details as your

firm's services or products, market and competition analysis, and sales strategies. A good plan must also incorporate financial statements and projections. Business Plan Pro covers these bases well. Its outline format walks you through what's needed at each step and comes with five pre-set business types built in: service, retail, distribution, manufacture,

and a combination of the above. There's also a home-office option. Each business type has a



READ, SET, GO: As Business Plan Pro walks you through the design of your business plan, you can edit the provided outline.

different sequence of statements and questions designed to stimulate your thinking and help you focus your plan. We were pleased to discover we could toggle between an explanation and an example upon entering specific information about our company. Depending on your style, you can tackle the topics sequentially or jump around.

Three icons in the upper-right-hand corner let you toggle among text, chart, and table modes. Pull-down menus can also be used for navigation and must be used on some screens to grab charts. You can replace boilerplate data in table templates to reflect your company's own financial aspirations. These tables translate into colorful charts, which can be exported in .BMP and .WMF formats for the final report.

Accounting

Great Plains Gets Back to Business with Profit 2.0

BY THERESA W. CAREY

The first version of Profit, a joint production of Microsoft Corp. and Great Plains Software, was a Type A personality's nightmare because it valued style over substance and was irritatingly slow. Now that Great Plains has taken it back, the package is more solid—packed with useful accounting features, trimmer, and faster.

Great Plains Profit 2.0 (\$249) offers as its strongest feature a logical design and setup. The opening screen displays a file cabinet with seven drawers; each corresponds to a typical accounting function. Clicking the mouse on the Transactions drawer, for instance, presents three file folders labeled Sales, Purchases, and Checkbook. To write a check, click on Checkbook and select the type of check from the drop-down list (Payment to Employee, Vendor, Multiple

Vendors, or Miscellaneous).

Great Plains has corrected one of Version 1.0's glaring omissions by allowing you to split a transaction across several different expense accounts. In addition, the invoice-creation feature has been improved significantly and now allows cus-

tomized cash transactions, and transfers between accounts. The program can also generate reports not usually found in programs in this price range, including a Statement of Change in Financial Position. The Profit Signs drawer contains seven quick charts for a snapshot of your business performance.

That's not to say Profit went from pathetic to perfect overnight. We found that setting up a new company with Profit is needlessly complex. Also, running a customized report is much slower than running the built-in reports. Another drawback is the lack of basic contact management, which many other similarly priced packages include (notably Dac Easy for Windows and M.Y.O.B.).

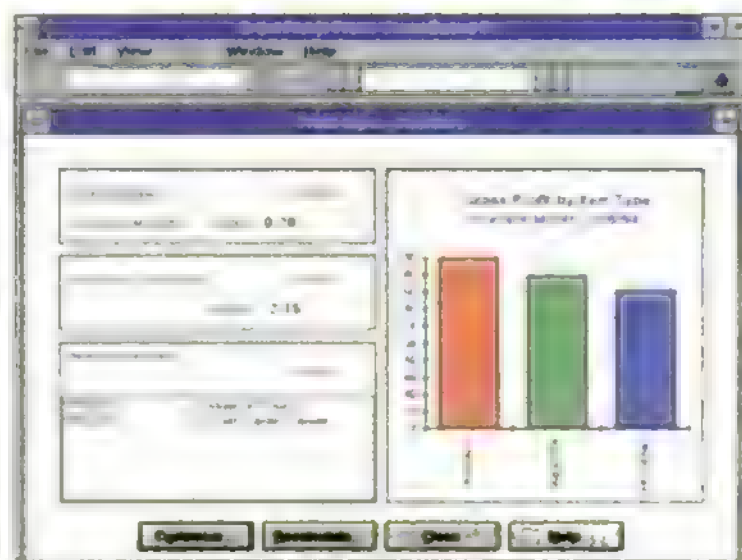
In sum, Profit is a solid performer with a lot of accounting integrity.

► Great Plains Profit

2.0. List price: \$249. Requires: 4MB RAM, 13MB hard disk space,

Microsoft Windows 3.1 or later. Great Plains Software Inc., Fargo, ND; 800-456-0025, 701-281-0550; fax, 701-281-3700.

Circle 430 on reader service card



QUICK LOOK: The Profit Signs drawer gives you the option of showing your company's financial health in a bar-chart format.

tomization of invoices via the Forms Customization Wizard.

Profit offers a cash management feature that allows checkbook reconciliation, miscella-

ALL-IN-ONE

Because most business-plan programs lack smooth integration, printing a finished plan with tables and graphs automatically inserted in the right place can be difficult. We were impressed with Business Plan Pro's abilities to print text, numbers, and graphics in logical order. You can also print only selected elements.

The program's written documentation fleshes out the guidance offered on-line, but it would be nice to see more background information and advice that would make the program a general business resource. More page-formatting commands would be welcome as well, though the default printed output looks very professional.

Nevertheless, no business-plan software can match Business Plan Pro for its navigational ease, customizability, and superb integration.

► Business Plan Pro. List

price: \$149.95. Requires: 4MB RAM, 2MB hard disk space, Microsoft Windows 3.1 or later. Palo Alto Software Inc., Eugene, OR; 800-229-7526, 503-683-6162; fax, 503-683-6250.

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■ PIMs

InfoRecall: Making Bits and Pieces of Information Add Up

BY DAVID HASKIN

If the basis of your business life is free-form computer notes and snippets of information, you may be interested in Phantech Software's \$99.95 InfoRecall 4.1. This PIM manages unstructured text (like customer contact notes and collections of background information) and adds an extensive search mechanism that makes putting these bits and pieces together easy.

Each record in InfoRecall can consist of as much as 32K of free-form text, which translates into about 25 pages. InfoRecall includes a built-in text editor and an entry template for adding basic contact information such as a customer's name, address, and company. We found that the template was a handy way to record basic information, but you can't modify it or create additional templates.

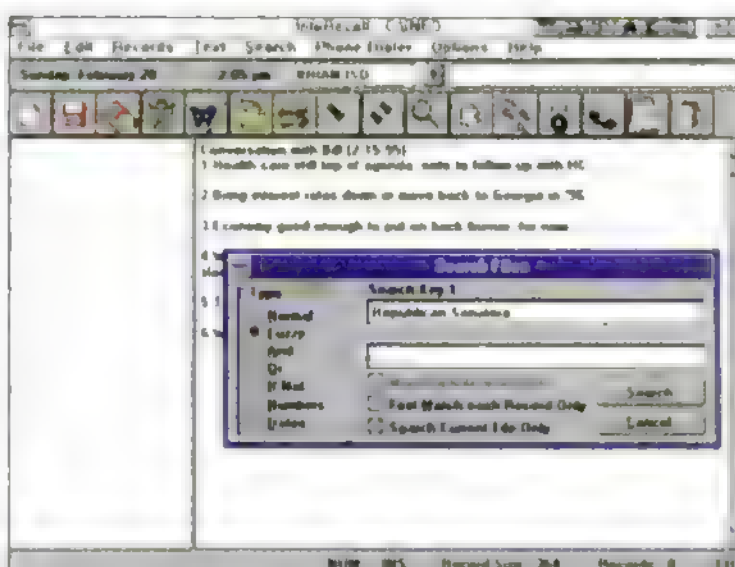
Once a record is named, InfoRecall's extensive text-searching capabilities can scan an on-screen record or the entire database. Unfortunately, InfoRecall's searches within a single record are far more limited than universal searches. With a universal search, you can use Boolean AND, OR, and NOT operators; search for records containing a range of numbers; and even conduct fuzzy searches for phonetically similar words.

Rudimentary hypertext links between records can be established, and InfoRecall uses DDE (Dynamic Data Exchange) to transfer selected text or an entire record directly to word processors such as Lotus's Ami Pro or Microsoft Word for Windows. On the other hand, InfoRecall has weak import capabilities and was unable to filter out extraneous characters when importing some older word processor files.

InfoRecall can import only one file at a time and can't use

text strings to chop up large incoming files into a series of records. This makes it cumbersome, for example, to add the contents of a large ASCII file containing multiple messages from an on-line forum to your InfoRecall database.

Despite this shortcoming, InfoRecall is an inexpensive and easy-to-use PIM for collections of text information. For heavy-duty text management



LOOKING FOR... InfoRecall's universal search dialog box presents the user with a wealth of options.

tasks, however, products like askSam for Windows offer a more complete set of tools.

► **InfoRecall 4.1.** List price: \$99.95 (upgrade, \$39.95). Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or later. Phantech Software Inc., Toronto, Ontario, Canada; 800-208-1311, 416-502-1311; fax, 416-502-1345.

Circle 402 on reader service card

■ Data Management

CrossTies Brings Object-Based Information Management to the Network

BY KATHY YAKAL

CrossTies Software Corp. has hit on a new way to manage people, projects, and data by extending its object-oriented information management scheme to the network. The \$299 CrossTies for Workgroups supports discussion threads, e-mail, and file-sharing; it also excels at keeping track of company-wide data.

CrossTies' greatest strength is that it works like a PIM: It creates a database of contacts, builds a calendar, and keeps track of random snippets of data. The new twist is that it can now build an information database for an entire organization. Every piece of data entered in CrossTies—a name, an activity, or a project—is classified as an object. To make a connection between objects, all you need to do is click on the Link icon.

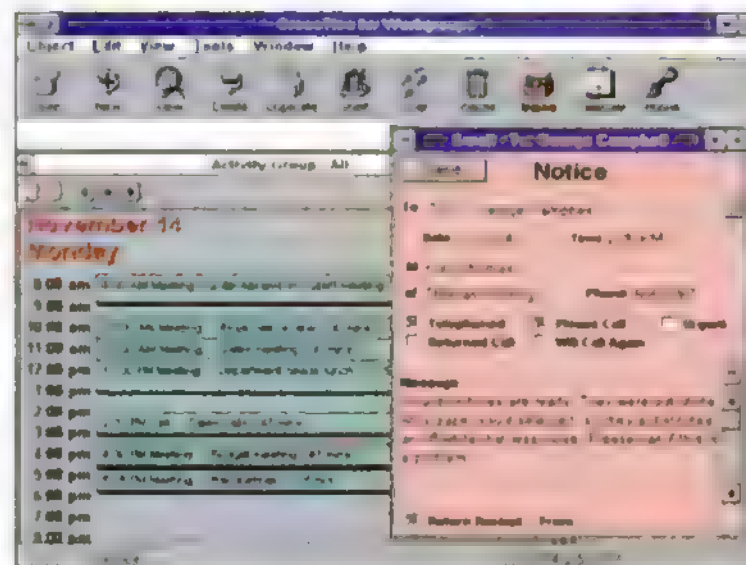
CrossTies has great reach, and since it can launch applications, it can even be used as a Windows shell. Program files (such as spreadsheets) can be pulled into CrossTies, attached to objects, and given descriptive filenames of up to 255 characters.

Though customizable, CrossTies' network capabilities don't require custom programming. Still, we found network setup to be tricky and time-consuming, since the documentation offers only a brief explanation of how to establish shared network drives. Each user maintains an individual database and shares objects via e-mail; large common files can be placed in a special network directory. A proprietary e-mail system is built into CrossTies; it also supports CompuServe Mail, Lotus cc:Mail (VIM), Microsoft Mail (MAPI), and Novell Network MHS. Data files can be imported in both ASCII and

now supported, as are conflict checking, an activity snooze alarm, and the ability to schedule recurring activities.

CrossTies for Workgroups successfully carries the program's data management metaphor to the group setting.

► **CrossTies for Workgroups.** List price: \$299 per user. Requires: 4MB RAM, 4MB



CALL HOME: CrossTies for Workgroups has a realistic on-screen phone message feature.

hard disk space, Microsoft Windows 3.1 or later. CrossTies Software Corp., Carrollton, TX; 800-955-8437, 214-407-9996; fax, 800-887-3784.

Circle 403 on reader service card

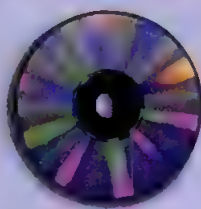
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■ Integrated Applications

Claris Puts It All Together with Works 3.0

BY DAVID HASKIN

Elements of integrated software should (as the name implies) work well together and form a program that is above all easy to use. ClarisWorks 3.0 for Windows—which contains a word processor, a spreadsheet, a database, and an illustration program—meets these goals. And at \$99, ClarisWorks is a bargain of a program that includes a lot for a little.

INTEGRATED PARTS

Most of the work that went into ClarisWorks 3.0 was aimed at making the whole greater than the sum of the individual parts. Many integrated programs use object linking and embedding (OLE) to bring disparate parts of the package into a cohesive whole—so that a portion of a spreadsheet or graphics image can live up a document. The downside is the increased memory requirements and slow response that OLE brings to the party.

Claris forged its own path with a proprietary—and much simpler—integration method. With ClarisWorks, you can add text, a spreadsheet, or a drawing to a document by clicking on an icon for that type of object and then drawing a frame that defines the added element's size and shape directly in your document. When you select the frame, the menus and toolbars change to reflect the contents of the frame.

The result is a more straightforward approach to integration than OLE 2.0's edit-in-place capabilities. But you can't create a "live" link between a spreadsheet and a word processing document that automatically updates the document when you

alter the spreadsheet's contents. The ClarisWorks way is to create a series of linked frames throughout the document. For example, we created one frame in our test sales-report document showing budget projections for each quarter of the year and added a linked frame later in the document showing only the budget totals. When we changed a quarterly figure, the total was updated.

In the word processing module, a notable addition is the ability to wrap text around frames. All you have to do is select a frame and choose how the text would wrap from the dialog box. After that, you can move the frame anywhere in the document and text continues to wrap around it.

The word processor's new outliner is helpful for organizing your thoughts. Unfortunately, it was our experience that using the outliner was clumsy for creating a consistently formatted structure of headings and sub-headings. Though you can create custom text attributes for each

say, an underlined and bold-faced top-level heading, you must create a separate text style in normal word processing mode and apply it manually to each top-level outline heading.

The spreadsheet module is reasonably powerful (it supports about 100 functions), but the

ARTISTIC CONTROL

The ClarisWorks illustration modules are composed of drawing and painting programs and now include a palette from which you can select color or black-and-white gradient fills. ClarisWorks' greatest strength in this area is a wide variety of drawing tools for such tasks as creating complex polygons and Bezier curves. Impressively, it also allows you to select a portion of a raster image and, by dragging handles, apply effects like perspective distortion.

ClarisWorks goes further than the competition by allowing you to create on-screen slide shows composed of any combination of document pages. Though you can't add flourishes like back-

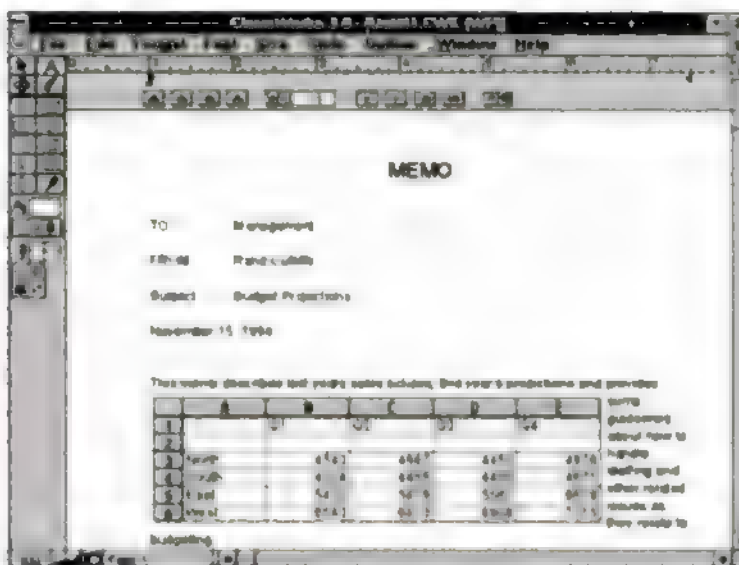
ground sound or transitions, ClarisWorks' slide shows will be all you need to create basic presentations.

Besides adding power, Claris made this program simpler to use by incorporating Assistants that, like Microsoft's Wizards, walk you through basic tasks. The Assistants work well, but Claris only includes seven of them. Missing are Assistants for such elementary tasks as creating labels and database queries.

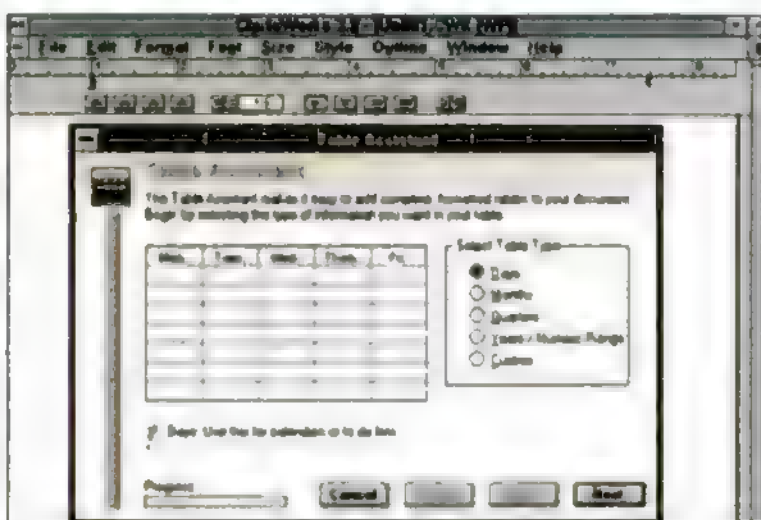
Paradoxically, ClarisWorks is now both easier to use and more powerful—but it will likely appeal to a more sophisticated user.

► **ClarisWorks 3.0 for Windows.** List price: \$99; upgrade, \$49. Requires: 4MB RAM (8MB recommended), 3MB hard disk space (8MB for full installation), Microsoft Windows 3.1 or later. Claris Corp., Santa Clara, CA; 800-325-2747, 408-987-8227; fax, 408-987-3932.

Circle 402 on reader service card



CROSSOVER: Create compound documents in ClarisWorks by adding a frame containing a spreadsheet.



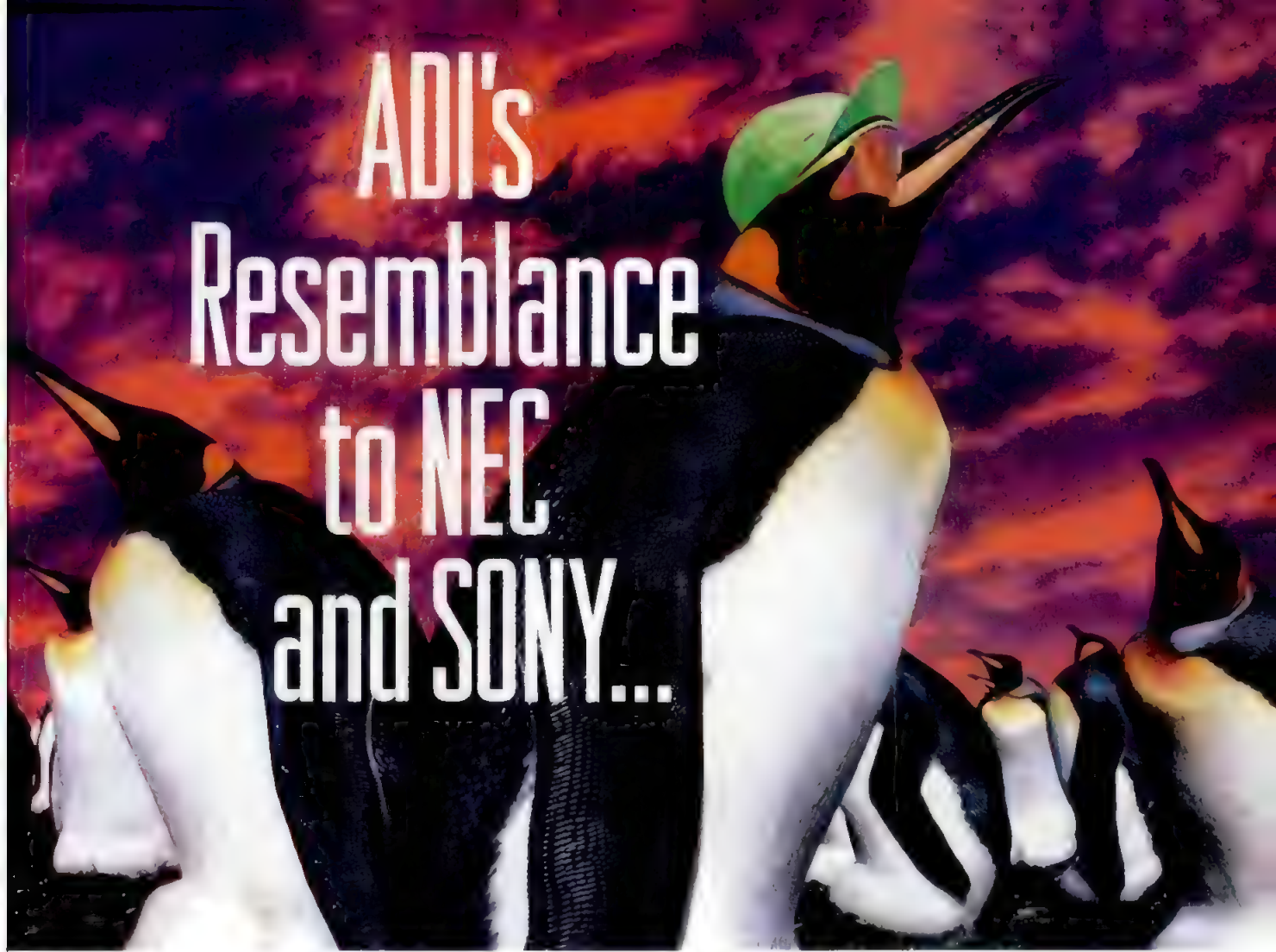
ASSISTANCE: Tasks are simplified with ClarisWorks' well-chosen Assistants, including this one for creating a table.

level of outline headings, those attributes disappear when you return to normal word processing mode to flesh the document out. To create an outline with,

charting capabilities offer just 12 styles and only limited control over the final product. By contrast, we found the database to be a powerful tool that was relatively easy to use. It includes a dialog box that walked us through the process of creating queries—including queries based on spreadsheet functions and automatic field validation.

At the other extreme, the mail merge capabilities in ClarisWorks are simple to use but not very powerful. Merge fields can be added to a word processing document from a simple dialog box, but you can't select database records to include in the merge from that dialog box. Rather, you must sort the database before the merge—an awkward process that puts the cart before the horse. The resulting merge file can't be saved as a new document.

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March 16, 1993
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CIRCLE 226 ON READER SERVICE CARD



Any way you look at it.

Voice Recognition

IBM's VoiceType Turns Talk into Type

BY DAVID HASKIN

IBM's VoiceType Dictation for OS/2 and Windows, the third entry in the suddenly crowded field of voice recognition dictation products, takes a slightly different approach to digitizing the spoken word. Based on IBM's existing OS/2 product, the hardware/software package comes with an ISA, Microchannel, or PCMCIA card and provides fast and accurate dictation. But it can be clumsy, and demands a high price in terms of system resources.

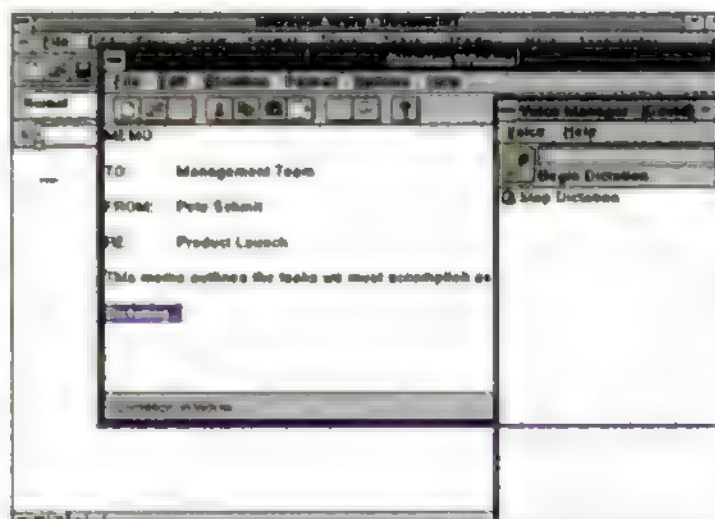
ROUGH START

Like the other Windows dictation products—Kurzweil Voice and Dragon-Dictate—VoiceType requires discrete speech, which means that you must pause between words. While awkward, this staccato speech pattern is easily mastered. By contrast, installation of the program was difficult. The included adapter card required an IRQ setting that another device was already using, a fault the installation program didn't detect. VoiceType wouldn't fully load and reinstallation of all 16 disks was the only solution. A similar problem may result if you install VoiceType on a compressed drive.

The next step is to train the system to recognize your voice (or *enroll* your voice, as IBM calls it). To do this, we had to read 270 on-screen sentences into the system's microphone. While we were able to stop to answer the phone, enrolling took about two hours. Then VoiceType compiles a profile of your voice, which required an additional 2 hours on our 90-MHz Pentium PC. VoiceType also requires a high level of system resources: 16MB of RAM,

63MB of hard disk space, and a 40MB Windows swap file.

Unlike its competitors, VoiceType doesn't allow you to dictate directly into a Windows application. Rather, the program places the dictated text



INDIRECT: IBM's VoiceType puts the words you speak into a dictation window. From there, you can send the text to an application via the Windows clipboard.

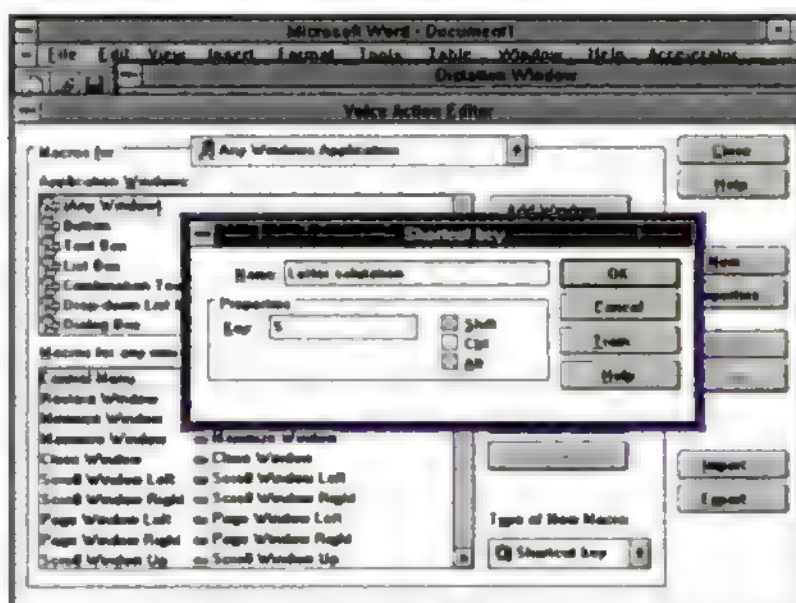
into a separate window, which you send to your application via the Windows clipboard. This can be awkward for large blocks of text and tedious for spreadsheets (for which we had to insert small bits of text repeatedly).

Also, the system allows for correcting mistakes only at the end of a document, rather than on the fly. This isn't necessarily an intuitive way to dictate letters, memos, and reports, but it works well if you have to look at something else (such as an X ray or work of art) while dictating. When you finish dictating, errors can be corrected by highlighting them and saying *correct error*. VoiceType then displays a dialog box containing sound-alike words to select from. After we chose the intended word, the program made the correction and registered it so that the mistake wouldn't occur the next time the word was spoken. We

found that while voice navigating to incorrect words works, using the mouse and keyboard was faster.

Overall, VoiceType Dictation is a fast and accurate way to digitize the spoken word. An hour after completing the enrollment process, we were dictating at about 70 words per minute, much faster than most typists can accomplish. IBM claims a maximum dictation speed of 100 words per minute.

The accuracy of VoiceType is enhanced by its ability to analyze context. The system can discriminate between sound-alike words such as *watt* and *what* by looking at the four most recently dictated words. VoiceType includes a 22,000-word dictionary; specialized dictionaries are available for emergency room workers, journalists,



INSTANT TEXT: You create voice macros in this dialog box to accomplish complex tasks with a simple voice command.

and radiologists. You can add up to 2,000 new words as well.

SPEEDS THINGS UP

Using voice macros can speed dictation by placing boilerplate text into a document; you need



From January 30 to February 3, go on-line to discuss IBM's VoiceType Dictation with reviewer David Haskin and with IBM representatives Howard Fields, director of marketing for speech and pen products, and Carlos Franceschi, manager, speech support products. Type GO EXEC at any CompuServe I prompt.

only say a single word. We used the word *salutation*, for example, to signify the start of a new letter. Macros are also good for navigating within Windows and launching programs. In either case, just type the key sequence or text into a dialog box, assign the macro a name, and click a button to train the program to associate the spoken name with the keystrokes.

Because VoiceType uses separate modes for dictation, commands, and control of Windows and applications, it

can be more accurate in each mode than other products. In command mode, when we said *file*, VoiceType opened the File menu instead of inserting the word *file* into the document. Unfortunately, VoiceType does not include application-specific voice commands.

While VoiceType will not render the keyboard obsolete, it is an excellent augmentation for those who cannot or choose not to type everything.

► **IBM VoiceType Dictation for OS/2 and Windows.** List price: With ISA card, \$999; with either PCMCIA or microchannel

card, \$1,099. Requires: 16MB RAM, 63MB hard disk space, Microsoft Windows 3.1 or later or OS/2 2.1 or later. IBM PC Co., Somers, NY. 800-825-5263.

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CIRCLE 117 ON READER SERVICE CARD

■ Communications

networkMCI Business Has Some Growing Up to Do

BY GREGG KEIZER

MCI's networkMCI Business hopes to grab a big slice of the electronic-information/electronic communications pie. While this \$100 package is a good start, its varied components form not so much a suite as a medley of several vendors' wares.

Individually, the components range from excellent to adequate. The e-mail front end, for instance, is a version of ConnectSoft's E-Mail Connection that can only poll an MCI Mail mailbox (the original E-Mail Connection program could retrieve mail directly from CompuServe and Prodigy mailboxes as well). Other features are retained, however, including a superb rules-based mail depositor and links with cc:Mail and Microsoft Mail.

The software for the infoMCI newswire service also comes from ConnectSoft. You can establish a profile by picking an industry and ranking interest levels for specific areas; infoMCI will then compile abstracts twice a day. You can request full-text articles on any story, receive flash stories immediately, and follow stocks of selected companies. But we found that you can track only one industry at a time.

Delrina's WinFax is the basis for faxMCI, the package's fax module. You can send and receive faxes, broadcast a group of faxes, and build fax cover sheets. It is one of the strongest elements of the MCI amalgam.

The weakest module is the document whiteboard application, which is based on DataBeam's FarSite and called conferenceMCI. Two users can view, annotate, and comment on documents. Unfortunately, these notes do not affect the original document, and users of

Word 6.0 will find odd fonts and spacing.

What networkMCI Business lacks is tight integration. You must, for instance, create and manage separate address books for each component, and you can't launch one of the components from within another. It is possible to fax news stories from within infoMCI by selecting the fax driver from the printer list, however.

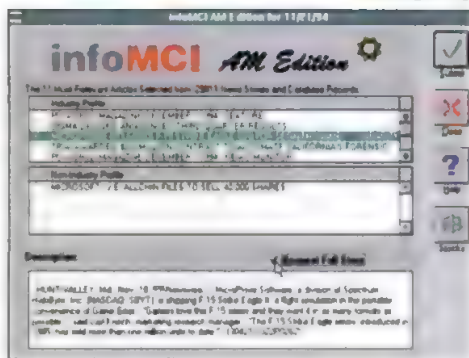
At \$100 for the four modules and at least \$50 for monthly fees,

networkMCI Business is expensive. From a detail-oriented perspective, the MCI approach to information does not include Internet access. But there are future plans for the inclusion of Netscape Communications' Netscape Internet Web browser and FTP Software's TCP/IP software, which will start at \$20 per month for a dial-up account.

Overall, the focus of networkMCI Business is scattered, and lacks an under-one-roof feel.

► **networkMCI Business.** List price: \$100. Requires: 4MB RAM, 20MB hard disk space, 9,600 bps or faster modem, Microsoft Windows 3.1 or later. MCI Business Markets, Inc. Atlanta, GA; 800-955-6505.

Circle 431 on reader service card



OBSERVE: Within infoMCI, you can selectively request full-text versions of any of the abstracts which are sent to your mailbox twice a day.

■ Business CD-ROMs

Learning from the Inc. Pros

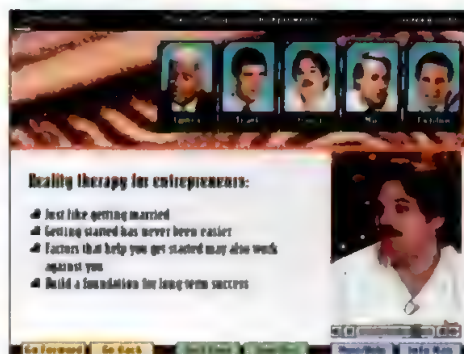
BY GAYLE C. EHRENMAN

Starting your own business can be one of the most exciting experiences of your life. It can also be one of the most terrifying. No matter how much you may know about balancing profits and losses, you're bound to have nagging doubts and questions. *Inc.* magazine's *How to Really Start Your Own Business* tackles these tough questions.

This interactive CD-ROM, which is adapted from an *Inc.* book and video series, offers business advice from nine people who started small and hit it big. Among the mentors who share their theories and experiences are David Liederman of David's Cookies, Gordon Segal of Crate & Barrel, and Mo Siegel of Celestial Seasonings.

What sets this multimedia learning tool apart from most how-to guides is the way it tailors the presentation of its information to the user's needs.

When you launch the program, you're asked a few brief questions about what you hope your business will accomplish five years from now. Your answers will determine which Mentor Panel of three on-line entrepreneurs can best help you achieve your goals. These mentors share



SOUND ADVICE: *Inc.*'s small-business start-up guide features a wealth of advice and tips from on-line pros.

their theories and experiences through brief video clips.

The program's 11 chapters cover everything you need to know, from developing an initial idea, to structuring your business, to managing your cash

flow. For those who don't want to learn chapter by chapter, there's an Info Map that shows the entire branching structure of the program. Here, impatient entrepreneurs can pick and choose the topics they're interested in. Those who need more detailed information about a subject can turn to the Resource Guide, which provides valuable contact information.

How to Really Start Your Own Business presents a wealth of useful information in an attractive, concise, and easy-to-understand manner. It can't guarantee that your business will be as profitable as those highlighted on the disk, but it can ensure that you get off on the right foot.

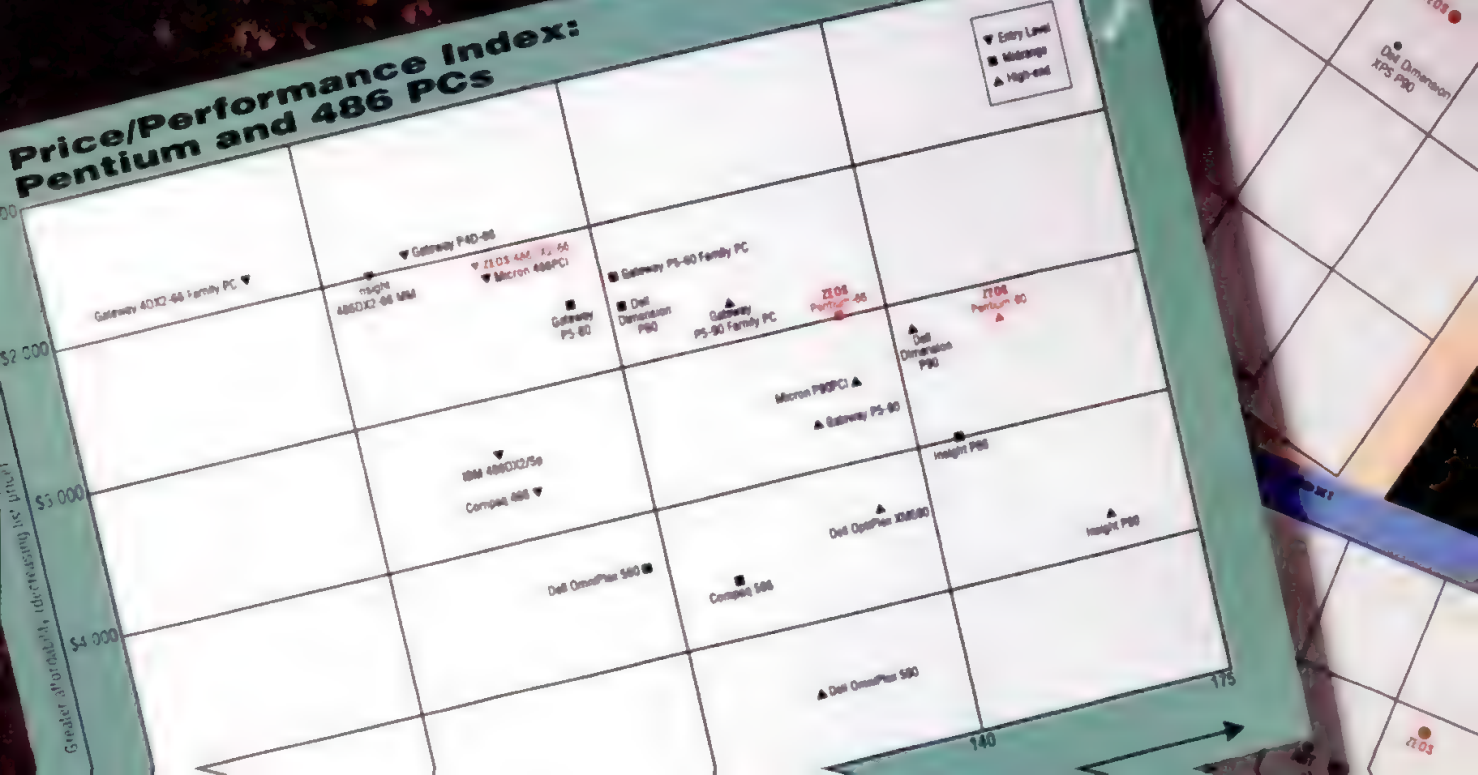
► **How to Really Start Your Own Business.** Estimated street price: \$49.95. Requires: 8MB RAM, 5MB hard disk space, CD-ROM, Creative Labs Sound Blaster-compatible sound card, Microsoft Windows 3.1 or later. Zelos Digital Learning, San Francisco, CA; 800-345-6777, 415-788-0566; fax 415-788-0562.

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Charting

A New Course In Personal Computing.

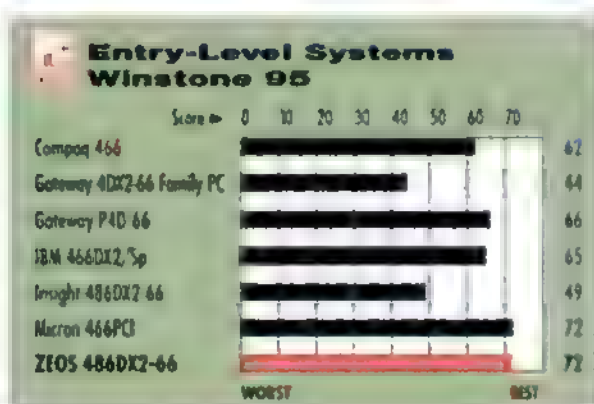
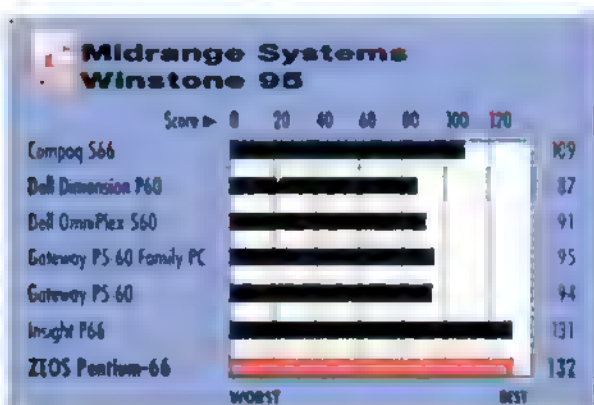
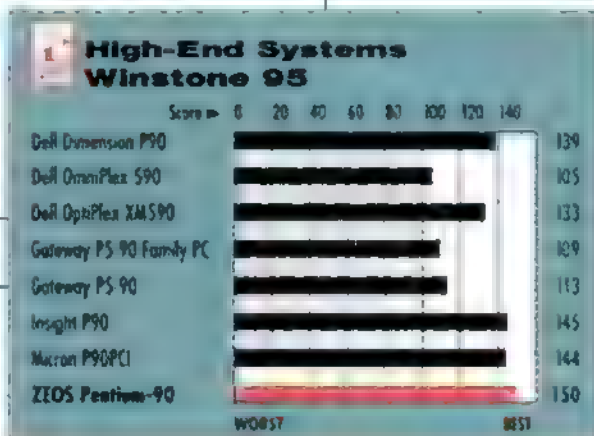
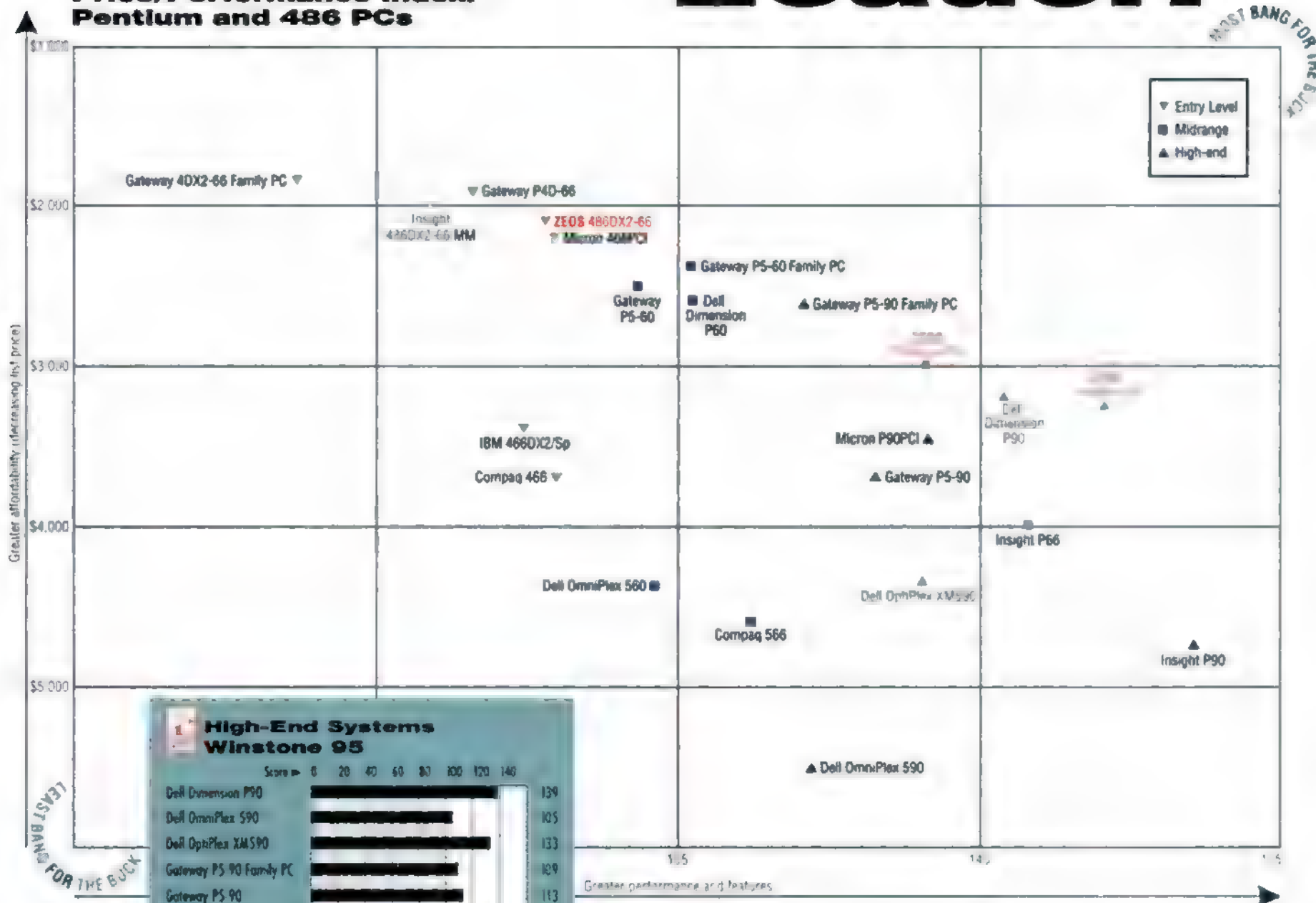
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"The ZEOS Pantera Pentium-90 was the top performer overall; the other two ZEOS systems—the ZEOS Pantera Pentium-66 and the ZEOS Pantera 486DX2-66—were also leaders in the midrange and entry-level tiers.... A major factor in the Pantera units' success was the outstanding Winstone 95 scores: The Pentium machines produced first-place scores in their respective tiers, and the ZEOS 486DX2-66 earned a top-five ranking among the entry-level systems."

—PC Magazine, December 6, 1994

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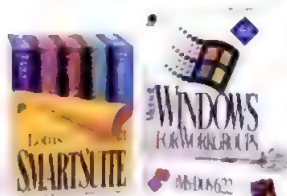
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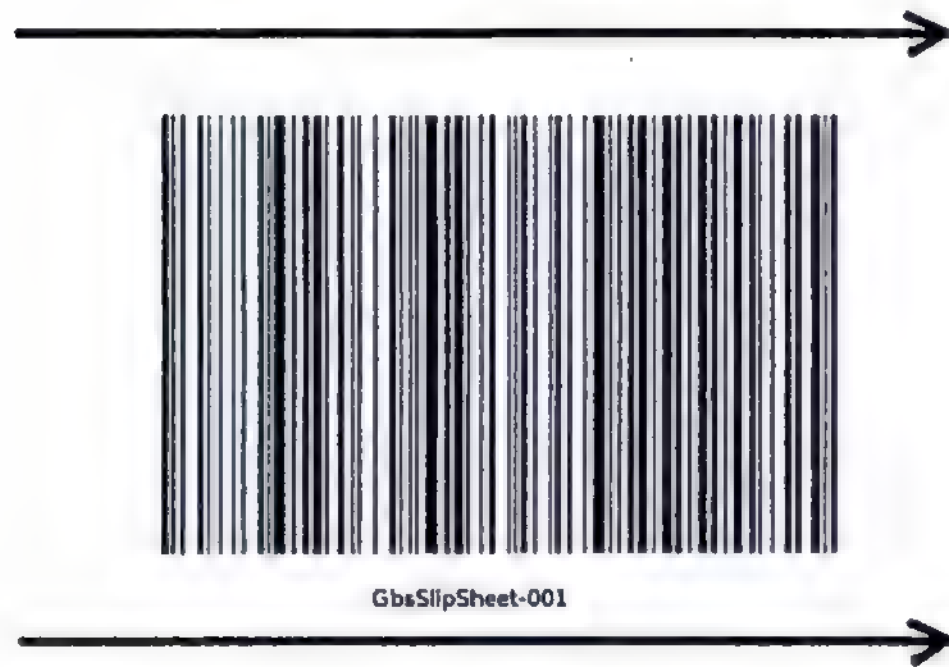
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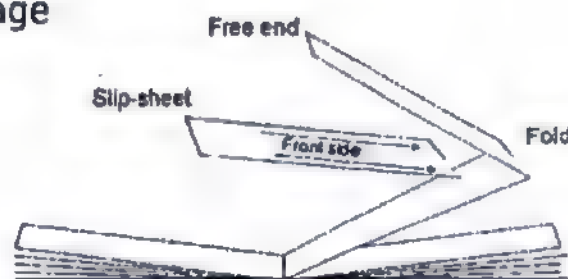
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Inverted Foldout slip-sheet

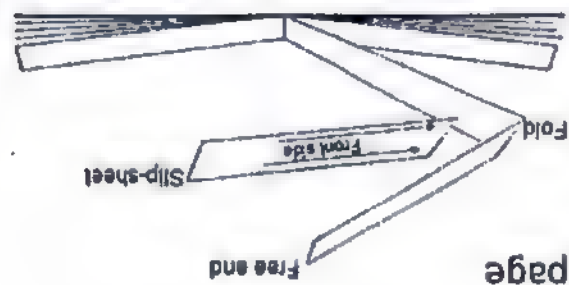


Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

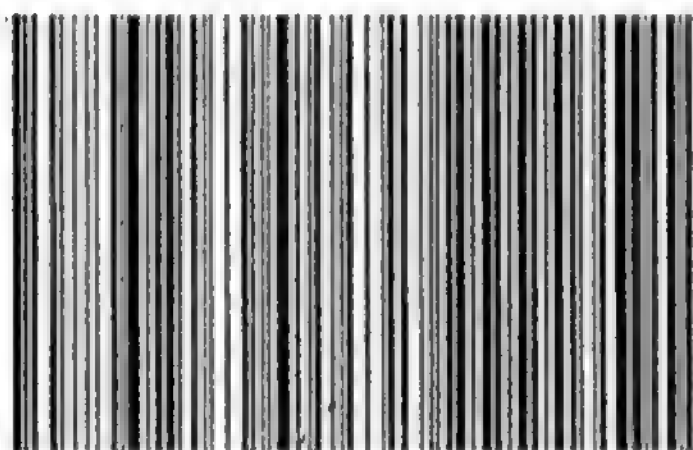


1. Open the foldout page
2. Insert this sheet with
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1. Follow instructions on the other side

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Gbs5lpBack-0018

Back

1. Follow instructions on the other side

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486DX2-66
January 1994
February 1994
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DX4-100
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Pentium-66
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Pentium-66
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Pentium-90
August 1994



Pentium-90
November 1994



486DX2-66
March 1994

Time after time, the ZEOS Pantera has been tested against the competition, repeatedly beating all others hands down. In *PC Magazine's* price and performance comparisons of technologically-advanced systems from primary computer companies, ZEOS is once again the unbeatable value.

Unmatched in its success, the Pantera is earning award after award—month after month. To date, the Pantera has received an unparalleled 30 top honors from leading industry publications! Experts agree that the ZEOS Pantera provides you with the biggest bang for your buck.

PC Magazine reported: "Overall performance leaders... the Pantera line has a lot to offer—strong performance at a reasonable price, with excellent documentation."

As *Computer Shopper* said: "ZEOS set the standard."

Continuing with the ZEOS tradition of providing you with top performance, unwavering reliability and exceptional value, the ZEOS Pantera is charting a new course in personal computing for you.

Chart-Topping Performance

The Pantera—based on Intel's 486, DX4 and Pentium processors—is at the top of the performance charts, breaking records and beating all others. Why? Superior engineering built into each Pantera—beginning with a ZEOS-designed motherboard created



specifically to take full advantage of the latest technological advancements. The motherboard is stocked with exceptional features such as an on-board PCI

Local Bus IDE Controller and support for up to four IDE devices. For the fastest video performance, every

Pantera comes with a Diamond Stealth 64-bit PCI video card with 1MB DRAM standard.

The results are unparalleled. "Mark a new high on the performance chart!"

PC World said the Pentium-66 and Pentium-90 Pantera PCs were "the fastest system(s) ever tested." The Pantera 60 also earned a Best Buy in December and January because of an affordable price and "performance that's more representative of a quick Pentium-66 than of the installed Pentium-60."

The Pantera 66MHz and 90MHz received the highest scores in all benchmark tests run by *Windows Sources* too: "The clear winner is the ZEOS Pantera."

All Points Covered

The Pantera is a first-rate example of ZEOS' commitment to provide you with an excellent value on an award-winning machine that will increase your productivity. With all the extras, options, and 100% compatibility with all major operating systems, you can't go wrong.



Many of our most popular money-saving Pantera packages are ready to ship *the same day you order*. We also give you the option to custom-design a system to your exact computing needs.

Either way, you can buy with confidence because of our on-going dedication to provide you high-quality features and state-of-the-art technology at an affordable price.

And the value doesn't stop with your purchase. *PC World* said: "ZEOS's nonstop toll-free technical support schedule is unbeatable."

PC Magazine agrees. In fact, ZEOS has won seven *PC Magazine* Readers' Choice for Service & Reliability awards.



Unequalled in performance, reliability and value, the ZEOS Pantera is the ultimate price/performance leader. To get the biggest bang for your buck, call your ZEOS Systems Consultant today at 800-554-7172.

ZEOS Can Ship Today!

Our most popular packages can be shipped the day you call.* Guaranteed!



486DX2-66 \$1745
Pentium-60 \$2095

Package #2:

- 8MB RAM
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus SVGA graphics card with 1MB DRAM
- 14" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse



486DX2-66 \$2195

Top Gun:

The above system modified to include:

- 128K SRAM cache
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM
- 15" SVGA color monitor upgrade
- 14.4/14.4 send/receive fax modem
- Lotus SmartSuite



486DX2-66 \$1245

Package #1:

- 4MB RAM, 128K SRAM cache
- 340MB hard drive
- 3.5" 1.44MB floppy drive
- VESA local bus SVGA color video
- 14" SVGA color monitor
- 4-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse



Pentium-66 \$2845
Pentium-90 \$2995

Editors' Choice:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 15" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-66 \$2995
Pentium-90 \$3195

Hottest Panthera:

The above system modified to include:

- 1GB local bus IDE hard drive
- 6-bay desktop case (Pentium-66)
- 10-bay vertical case (Pentium-90)



Pentium-66 \$3318
Pentium-90 \$3468

Best MM:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- 16-bit sound card, stereo speakers
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 17" SVGA color monitor
- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-90 \$3895

Best MM Supreme:

The above system modified to include:

- 24MB RAM
- 1GB local bus IDE hard drive
- Altec Lansing high-power speakers



DX4-100 \$2995

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- External 3.5" 1.44MB floppy drive
- STN color VGA 7.9" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 7.8" x 10.2" x 1.7"; 3.9 lbs.

DX4-100 \$3195

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- Dual-scan color VGA 10.3" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 8.9" x 11.7" x 1.9"; 6.3 lbs.

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(A sampling of our *Computers Now!* packages is shown at left.)

2 For same-day shipping, call ZEOS at 800-554-7172 before 1 p.m.

Central Time, Monday-Friday.

3 Upon credit approval, we'll ship your system *the same day you order!*

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If we accept your order for immediate shipment and fail to ship your system under the conditions outlined, we will ship it *at our expense* as soon as it is ready.*

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*Orders must be for Computers Now! configurations; we've listed just a sampling here. Since we continuously update this list of configurations, please call to confirm your system is on the list. This offer is good only as long as these pre-built systems remain in stock. Other ZEOS systems and custom configurations may take slightly longer—about a week. All orders are subject to credit approval. Monitor upgrades available on all desktop Computers Now! packages. Orders must be received by 1 p.m. Central Time, M-F.

Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 48-month lease. HP purchase option. All prices, specifications and availability are subject to change without notice. Call to confirm these and warranty details. Prices do not include shipping. Novel compatibility a Developer Tested Only. Novel makes no warranties with respect to this product. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside and Pentium Processor Logos are trademarks of Intel Corporation. ZEOS is a registered trademark, Computers Now! is a registered service mark, Panthera, Ambra and ZEOS Meridian are trademarks of ZEOS International Ltd. ©1995 ZEOS International Ltd. 1301 Industrial Blvd. Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEIS). PAN-PCB-9502A

CIRCLE 155 ON READER SERVICE CARD.

Structured Query Language

AUT Builds a Bridge from Access to SQL

BY RICARDO DOBSON

Microsoft's Access Upsizing Tools (AUT) is an inexpensive way to jump on the rapid development bandwagon, for it lets you take advantage of the RAD abilities of the Access 2.0 database and the scalability of SQL Server. At \$99, AUT is an effective way to quickly prototype and move Access-based applications to the world of structured query language.

AUT is built around two tools for creating applications. The Upsizing Wizard converts and uploads Access tables on a workstation so that they work with Microsoft's SQL Server software. Two key dialog boxes guide the developer through the process of specifying which data tables to upsize to SQL and how to handle the table's properties.

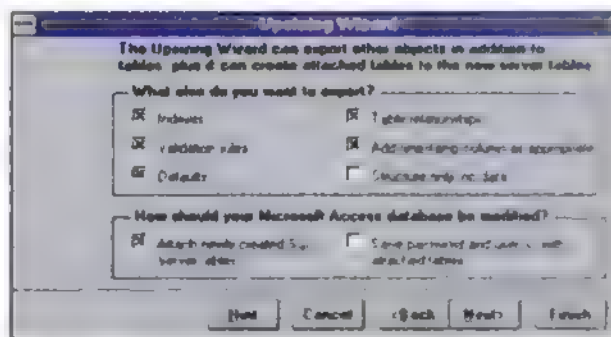
AUT creates a new parallel data structure on the SQL server that conforms to the structured query language, while leaving the Access-based data intact. This simplifies restoring the original, basic Access-only design so that a different selection of tables can be upsized at a later time. The data tables selected for upsizing appear twice in the database window. Those that contain the suffix *remote* run on SQL Server; those with the suffix *local* refer to the original Access database table. The wizard modifies other database objects so that they reference the attached SQL tables.

The second tool is the SQL Server Browser, which is similar to the Access database container. The Browser window aids in creating, deleting, and editing SQL database objects, such as tables, views, defaults, views, and stored procedures. The tools come with a new ODBC driver for SQL. While the package does not require this driver to work, using the ODBC drivers accelerates reading and writing

of data between SQL Server and Access.

The AUT package represents different challenges to its two potential audiences: SQL developers must learn about the rapid application development features of Access. But Access developers have the more formidable challenge of gaining the basic level of familiarity with SQL Server needed to produce quality applications quickly.

Access developers who have



UPSIZE: Developers can designate which tables to process and how to send the tables to SQL Server with this AUT dialog box.

their sights set on enterprise operations will find the investment of learning SQL and

becoming familiar with Access Upsizing Tools worth the reward of building powerful custom client/server applications.

► **Microsoft Access Upsizing Tools.** List price: \$99. Requires: 4MB RAM, SQL Server 4.x for Windows NT or SQL Server 4.x for OS/2. Client requires: Access 2.0, including ODBC. Client/server network requires: Microsoft Windows for Workgroups, Windows NT, Windows-compatible network such as NetWare or LAN Manager. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329.

Circle 427 on reader service card

Application Development

VisualAge Team: Connect-the-Dots Apps

BY GABRIELLE GAGNON

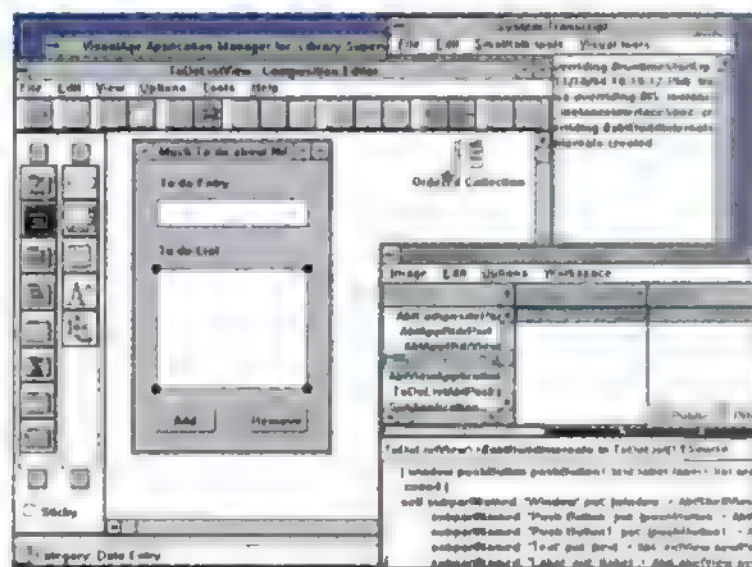
IBM's latest development tool for client-server applications, VisualAge Team for Windows, Version 2.0 (\$4,995), extends VisualAge Team for OS/2 to Windows (see "RAD Tools: RADical Development," November 8, 1994). Because VisualAge Team can connect to PCs, mainframes, and mini-computers, it is a one-stop program for those upsizing and downsizing alike.

The beauty of VisualAge is that it lets you build an application by drawing connections between objects, which it calls parts. Except for the absence of OS/2's System Object Model (SOM) and Distributed SOM (DSOM) support, VisualAge is functionally equivalent to its OS/2 counterpart. We successfully ported applications between the OS/2 and Windows versions.

VisualAge remedies several problems found in Version 1.0. The Connection Debugger can now trace through the web of

connections or look at the overall activity between parts. We also found its ability to inspect and edit objects that are being passed along each connection to be a key addition. Performance has significantly improved as well, and the cumbersome packaging scheme has been replaced by a one-step procedure.

The program offers several



PARTS IS OBJECTS: VisualAge creates applications by connecting objects, or parts, as the program calls them.

new parts, including DDE support for both client and server, a View Wrapper that allows you to turn secondary windows into icons, and a Form Input checker for validating user input. There

are also new browsers, performance analysis, and debugging tools, as well as color and font control. In addition, the inclusion of double-byte language support makes VisualAge an international development tool.

The program's Trailblazer browser combines the functionality of several Smalltalk browsers into one multipurpose tool. Unfortunately, it was not fully documented and has no context-sensitive help. This was more of an inconvenience since all of the documentation is provided on-line. The absence of

method source code for several system classes is a more serious problem. Another serious drawback is the lack of report-writing tools (IBM promises to rectify this).

Despite these flaws, VisualAge Team for Windows is a welcome addition to the growing array of Windows enterprise development packages.

► **VisualAge Team for Windows, Version 2.0.** List price: \$4,995. Requires: 16MB RAM, 10 MB hard disk space, Microsoft Windows 3.1 or later. IBM Software Solutions Corp., Armonk, NY; 800-426-2279, 919-469-7763; fax, 919-469-7423.

Circle 426 on reader service card

■ Desktop Publishing

Corel Breathes New Life Into Ventura

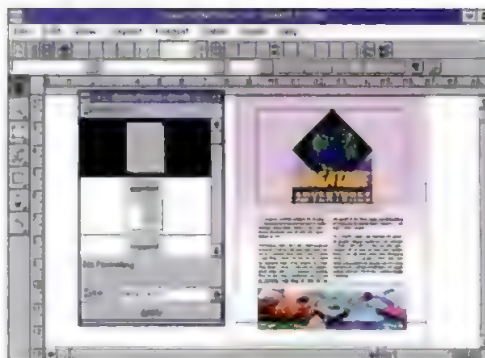
BY JAMES KARNEY

After several months of delay, Corel Corp.'s much-overhauled revision of Ventura Publisher has arrived. And it appears to have been worth the wait. Corel has completely redesigned the user interface into what is now one of the most elegant Windows workspaces around. With nearly limitless design capabilities, Ventura has something for everyone. Longtime veterans will be happy to see much that is familiar, as well as several extra goodies. Newcomers to this desktop publishing package will find unparalleled power and flexibility in building and modifying large and complex documents.

Ventura 5 is priced at \$595

and comes with a variety of add-on applications, including Corel Capture, Corel Kern, Corel Mosaic, Corel Photo-Paint, and DB Editor, making it a one-stop desktop publishing powerhouse.

Ventura is also included as part of the package CorelDRAW 5.0 and shares much of CorelDRAW's look, feel, and features. Seven primary tools that are identical to DRAW's tools are located on the toolbar, including Pick, Zoom, Fill, and Outline. Corel has also included the DRAW program's fancy fills and a host of fonts and clip art. There are handy roll-up menus



NEW FACE: Ventura's interface has been vastly improved and now sports roll-up menus, drag-and-drop editing, and excellent graphics handling.

that allow easy selection of page layout and paragraph styles, rules, and most other routine operations.

COMPLEX DESIGN TOOL

Ventura 5 has tools that can handle just about anything. For example, Ventura has a Shape tool, which we found perfect for manipulating the outline of a graphics element that you want to wrap text around. By the same token, the Shape tool is an excellent way to force type to fill pre-defined shapes.

Even with these new features, Ventura keeps its well-deserved reputation for reliably handling large documents. There are powerful table and equation generators, *Continues*

■ Desktop Publishing

Page Magic: Instant Brochures, Newsletters, Fliers. . .

BY EDWARD MENDELSON

Page Magic is a low-priced desktop publishing program designed for people who aren't interested in learning about design or about the intricacies of complicated layout software. The \$69.95 Page Magic 1.01 package, from NEBS, a large paper manufacturer, comes with a wide variety of preformatted templates and the unique ability to match the paper to the task.

If Page Magic looks familiar, that's because it's an enhanced version of the package formerly marketed by Timeworks as Publish It for Windows and by GST Software (the author of the program) as PressWorks. NEBS now has exclusive rights to this hybrid program, which mixes many of the features of a desktop publishing package with some of the features of a word processor,

along with the ability to import clip art, screen captures, and images from Photo CDs.

QUICK DESIGNS

The program comes with 104 preset templates, including those



BROWSING: Page Magic comes with 300 clip-art images and a browser to help you put the perfect image in your document.

for fliers, business cards, newsletters, brochures, and envelopes. Almost all of these instant designs come in blank versions, where you fill in the

text, as well as versions filled with dummy text that you replace. You're likely to be impressed with Page Magic's flexibility and solidity but a little disappointed by the excessive number of mouse clicks that it requires before you can get any work done.

Page Magic uses frames as containers for adding text, graphics, and OLE objects to a document. Unfortunately, the program isn't smart enough to understand that you want to put text in a frame if you start typing while the frame is selected. Instead, you have to click on toolbar buttons to switch among four modes: frame, text formatting, paragraph formatting, and drawing. As you switch modes, the toolbar changes to match the kind of work you're doing. A more convenient feature is a horizontal

color palette, which is permanently displayed at the foot of the screen and allows quick color changes for whatever object you're working on. It does have one caveat: You can't view more than one page at a time.

Text features include automated bullets and a convenient bullet-selection menu. We found that Page Magic can alter word spacing, but only by adjusting the spacing between letters. For the most part, the formatting menu is overly complex. Text can flow around graphics, but only if you draw the outline of the graphics by hand.

When you import text or graphics, Page Magic lists the filenames in a Ventura-style list of stories, bitmaps, line art, and OLE objects. Smoothly implemented OLE 2.0 support lets you use the toolbars and menus of OLE servers such as Visio or WordPerfect Draw while you edit an imported object directly on the *Continues*

First Looks

support for complex headers and footers, and even a spell-checker and thesaurus. Novices will appreciate the program's Quick Format utility, which jump-starts the process of creating complicated tables. Another real advantage is a handy Type Assist feature—similar to Microsoft Word's Auto-Correct function—that can automatically fix minor typographical errors on the fly or act like a macro, converting a predefined shorthand string into a longer text block.

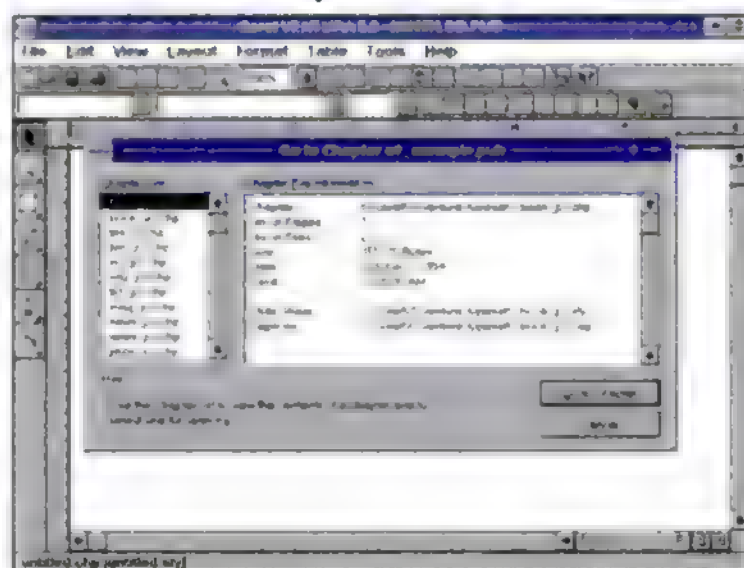
All is not new with Ventura. The venerable desktop publishing program continues to determine typographic layout for elements by using predefined tags to which attributes have been assigned. Its high-quality typography remains true to Ventura's tradition, and tools include an auto-wrap feature for graphics, type kerning, and general type management. The biggest change here is the Copy Editor feature, a practical typing and editing environment that the package badly needed. Ventura keeps style tags listed on the left side of the screen, while the editable text is shown on the right with its format attributes. We found this a great way to keep track of the text and all formatting assignments. Ventura can still import documents and graphics from most Windows applications.

ELECTRONIC PUBLISHER

With Ventura, all markup and file-attribute information can readily be imported and exported as tagged ASCII files—a critical feature in document-processing software. By contrast, Aldus PageMaker is still unable to do this. Access to the tagged files ensures that they can be easily transformed into the Standard Generalized Markup

Language (SGML) for electronic distribution.

File import from rich-text format has been enhanced thanks to Corel's licensing of Zandar Corp.'s wizard technol-



CHAPTER AND VERSE: File handling in Ventura is now done via the Publications Management window, which allows easy movement through complicated documents.

ogy. Using Zandar's Tagwrite program, Ventura now supports point-and-click import of fully styled .RTF files—including tables. This improvement means you no longer have to reformat or tag an imported document manually.

In the past, Ventura documents focused on the chapter file. File management is now keyed to what the program calls the *publication*, which is com-

posed of one or more chapters of a work in progress. Each chapter can be up to 9,999 pages long and is stored with its stylesheet and pointer information. The vastly improved Publication Manager aids the user in navi-

gating through documents and provides easy access to all the files, including useful summary information. With the included Corel-Mosaic program, you can manage complex graphics files and directories, preview the graphics, and drag them into a document. The process automatically creates a frame for the graphics. The Corel clip-art and image library is now a de facto extension of Ventura. Unfortunately, Ventura still requires that a frame be created before a graphic can be merged, which tends to limit experienced users from handling text and graphics merges in files prepared

outside Ventura. Corel designers have said that eliminating the frame requirement is high on their enhancement list for Ventura 6, which is expected later this year. Another area of emphasis should be eliminating the annoying problem with the page-layout view, which often truncates the image of a page or allows the body of the page to be moved off-screen.

All told, Corel has done an excellent job in breathing new life into the Ventura workhorse. This new edition is a joy to work with, and it is true to its heritage. Given the package's power, ease of use, and assortment of included software, this is a real value for the desktop publisher.

► **Corel Ventura, Version 5.** List price: CD-ROM, \$495; with floppy disk, \$595. Requires: 8MB RAM (16MB recommended), 14MB hard disk space, Microsoft Windows 3.1 or later. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-8200; fax, 613-761-9176.

Circle 423 on reader service card

Page Magic

CONTINUED FROM PAGE 50

Page Magic page. Graphics imports include most major formats, and we had no problem importing files that some other programs can't handle. Text imported from major word processors comes with much of the document's original formatting intact. The program doesn't recognize Microsoft Word for Windows 6.0 or WordPerfect 6.x files. Using imported text, we were able to create a document of over 400 pages, but the program crashed after we moved a few times from the beginning to the end.

GRAPHICS ADD-IN

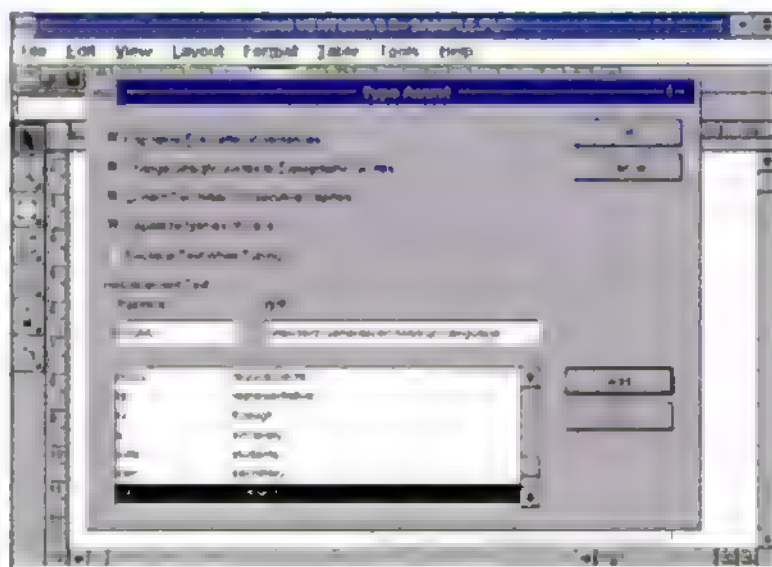
A suite of add-in programs, which are accessible from the toolbar, includes a clip-art browser that displays only the line art supplied with the program (you can't add your own). A "keypad" program, similar to Windows' own Charmap, lets you select special characters.

Page Magic lacks the formatting flexibility of Serif's PagePlus and the stunning automation of Microsoft Publisher, but it's a highly effective package for anyone who wants to use standard templates for creating competent though unspectacular documents.

For more colorful documents, NEBS offers something that other software of this type doesn't: the ability to choose from a variety of specialized papers that work with the Page Magic templates. Using the Company Colors stock, we were able to create professional-looking designs that had a banner here or a ribbon there with minimal input. And after all, that's the purpose of Page Magic—quick and easy business forms and brochures.

► **Page Magic, Version 1.01.** List price: \$69.95. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later. NEBS Inc., Groton, MA; 800-822-5254, 508-448-6111; fax, 800-234-4324.

Circle 424 on reader service card



INSTANT CHANGE: Ventura's Type Assist feature can automatically replace a string of text with a full block of text or make corrections on the fly.

posed of one or more chapters of a work in progress. Each chapter can be up to 9,999 pages long and is stored with its stylesheet and pointer information. The vastly improved Publication Manager aids the user in navi-

A man in a dark suit, white shirt, and patterned tie is smiling and looking towards the camera. His hands are clasped in front of him. In the background, a red sports car is visible, slightly out of focus.

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OS/2 Warp is available from your software dealer. It's also available from IBM for \$89 by calling 1 800 3 IBM-OS2.

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■ Databases

Alpha Five: Drag-and-Drop Your Way to an Easier Database

BY STEPHEN W. PLAIN

Alpha Software's Alpha Four has long been acknowledged as one of the most powerful, yet easiest to use DOS databases around. The \$129 Alpha Five extends to the Windows platform and should appeal to all levels of users with its innovative use of the drag-and-drop process and its excellent field level control. Alpha Five is a good database choice for novices looking for a good place to store data and experienced database users interested in a powerful applications tool.

Like its DOS predecessor, Alpha Five is based on the industry standard .DBF file format and organizes multiple-table databases into sets. Alpha Five also handles dBASE IV .MDX production indexes, uses the expanded FoxPro .FPT memo field format, and includes a centralized group of files that form a data dictionary. The data dictionary is important because it serves as a repository for scripts, as well as the various field layouts, validation rules, and stored query definitions for a particular database or set.

CONNECT-THE-TABLES

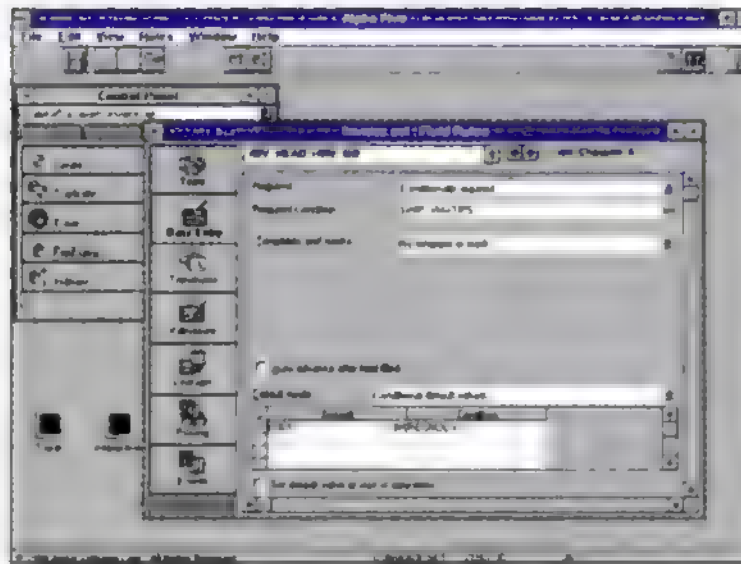
To relate multiple tables to each other, we found it easy to define a set with the Set Editor. New relationships are created simply by dragging lines between the table names. One-to-one and one-to-many relationships can easily be defined for tables in the set by selecting the linked fields from side-by-side lists.

Alpha Software has changed the database's appearance as well, giving Alpha Five's user interface a chiseled 3-D look. The program's Control Panel, for example, is tabbed and now has a look and feel much like Borland's dBASE for Windows.

The interface organizes common database functions into four panels—Apps, Database, Tools, and Views. The Apps panel gives you access to a variety of operations from applications that you have created. The Database section centralizes all manipulation commands for databases, indexes, and sets. The Views panel gives you access to the major interface elements (such as crosstabs, forms, mailing labels, and reports), while the Tools panel includes data manipulation commands (such as append, copy, export, import, and pack).

Creating a new database in Alpha Five is a straightforward process, whether you do it through the program's Genie—Alpha Five's version of a Wizard-like handholder—or from scratch. The Genie lets you pick from 16 predefined database structures. There are also query and report Genies, but none for setting up forms.

We found the query Genie to be very helpful; it guides you step-by-step through the process of building a query (you point and click to create the query's criteria; the Genie then populates the query's design grid).



FIELD OF DREAMS: Much of Alpha Five's flexibility is found in its rich field level control.

Using the report Genie, you can create group/total, repeating form, summary-only, and tabular reports.

One of Alpha Five's most powerful features is its Field Rules Card, a window that centralizes all of the details associated with fields in the current database or set. The Field Rules Card is organized into seven categories: Data Entry, Events, Lookups, Posting, Transforms, Type, and Validations. By setting the Type rules, you can define calculated and auto-incremented fields, as well as designate three special memo types: bitmap, OLE, and rich text memo format. You can define conditional behavior—such as conditional templates and conditional default values—that changes your database's properties according to expressions based on other field values.

Alpha Five forms are created via drag-and-drop: All you need to do is move form objects (field, form, and record actions; scripts; and standard Alpha Five dialog boxes) into the form template. Drag-and-drop also simplifies the sometimes tedious task of custom-designing menu screens.

A SEASONED REPORTER

Alpha Five also covers the bases well when it comes to reporting. Reports, form labels, and mailing labels are treated as separate views, each possessing its own customizable designer. The Report Editor uses a traditional banded format and provides available fields from a drag-and-drop list. But the Letter Editor has a different look, which contains a section for your letterhead as well as an area for text. Because it is based on rich text format, the Alpha Five Letter Editor can import formatting with text. There's no need to link your database to an external word processor to get professional-looking output.

As with most first releases, the Windows release of Alpha Five has its share of minor flaws. Scroll bars in a browse window, for example, don't always move proportionally to the data. We also had some difficulty editing OLE memo fields: While we could successfully edit an OLE document and update the data field, Alpha Five would not let us open a saved document from the OLE server application and have it update the field. The program's most glaring setback, however, is its lack of compatibility with the DOS-based Alpha Four, due to the differences in index and memo formats between the two products.

Despite these few nuisances, Alpha Five is a welcome addition to the Windows database crowd and continues Alpha Software's tradition of user-friendly databases.

► **Alpha Five.** Estimated street price: \$129. Requires: 8MB RAM, 15MB hard disk space, Microsoft Windows 3.1 or higher. Alpha Software Corp., Burlington, MA; 800-451-1018 ext. 117, 617-229-2924; fax, 617-272-4876.

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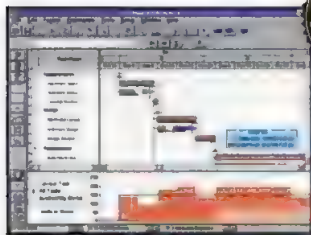


From January 23 to 27, go on-line to discuss Alpha Five with Alpha Software co-chairman Richard Rabins and reviewer Stephen W. Plain. Type GO EXEC at any CompuServe! prompt.



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■ Spreadsheet Add-ons

Neuralyst 1.4 Turns Data into Answers

BY CRAIG STINSON

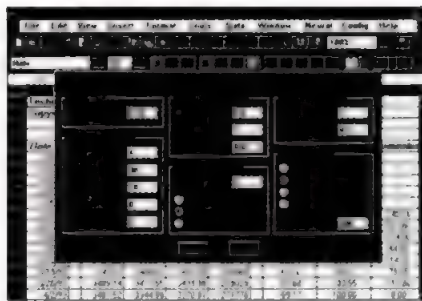
If your spreadsheet work requires more intelligence than Microsoft Excel currently delivers, Neuralyst 1.4 for Excel can help by making predictions based on unstructured or scattered data without your having to formulate rules or equations. Based on a simulation of pattern-recognition and learning processes, the \$195 package aids in deciphering problems where data is plentiful—such as in market analysis—but unstructured.

Neuralyst 1.4 is one of two inexpensive products that bring neural network analysis to the Excel user. Like its competitor, Promised Land Technology's Braincel (First Looks, May 17, 1994), Neuralyst 1.4 requires the user to enter and, in some cases, preprocess a subject's data. With custom menu commands, the user develops and trains the neural network to a specified level of accuracy and then turns it loose to predict future or hypothetical outcomes.

The most important new feature in Neuralyst 1.4 is an optional module that uses genet-

ic search algorithms to produce the optimal network parameters. Other changes give the advanced user more tuning options and allow the product to solve more complex problems.

To help jump start the neural network process, Neuralyst 1.4 comes with 11 example applications that



PREDICT: Neuralyst 1.4 uses neural net technology to interpret a set of data that defies structure.

show both what its technology can and cannot do. This version also comes with a set of macros to assist the technical market analyst in preprocessing historical data.

With Neuralyst 1.4, you can turn seemingly scattered data points into a coherent theory.

► **Neuralyst 1.4 for Excel.** List price: \$195. Requires: 4MB RAM, 2MB hard disk space, Microsoft Excel 4.0 or later, Microsoft Windows 3.1 or later. Cheshire Engineering Corp., Pasadena, CA; 818-351-0209; fax, 818-351-8645.

Circle 420 on reader service card

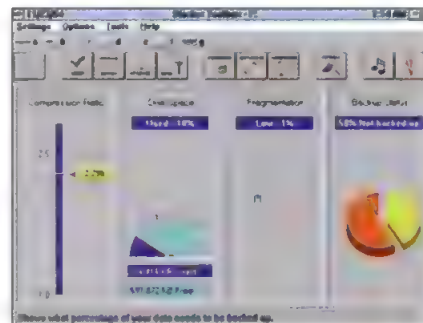
■ Windows Utilities

Multimedia Stacker Frees Precious Memory

BY BARRY BRENESAL

What could be better than turning a 500MB hard disk into a 1GB hard disk through disk compression? Regaining the memory used by the compression software's driver.

Stac Electronics' \$99 Multimedia Stacker uses Helix Software's Multimedia Cloaking to produce nearly invisible drivers for software caching, mouse control, and CD-ROM extensions. Together, these cloaked drivers



INFOCENTRAL: Multimedia Stacker provides key data on compression ratio, fragmentation, and free disk space.

take up only 10K of memory—one-eighth as much as the MS-DOS drivers—freeing up space for multimedia or other purposes.

These drivers are fully functional—they just have a smaller footprint. We found the menu-based installation was simple and straightforward, but the command-line-based configuration was awkward at times.

Also included is Helix Software's Discover memory analysis utility, which provides a good level of memory allocation information. Stacker itself can now handle 32-bit file access under Windows for WorkGroups, producing a boost to disk speed.

Starting with the assumption that you can never have enough hard disk space and memory, MultiMedia Stacker succeeds on both counts.

► **Multimedia Stacker.** Estimated street price: \$99. Requires: 1MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later. Stac Electronics, San Diego, CA; 800-522-7822; 619-794-4317; fax, 619-794-4573.

Circle 421 on reader service card

■ Windows Utilities

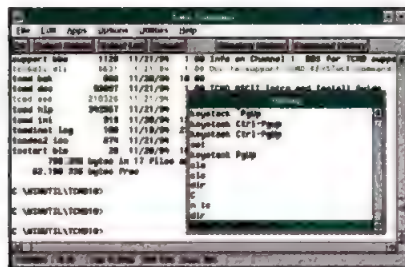
Take Command Brings Back The DOS Command Line

BY BARRY SIMON

If you look back with nostalgia on the power of the DOS command line and wish you could combine the best aspects of character and graphical interfaces, you'll want JP Software's \$49 program, Take Command. Based on the company's 4DOS product, Take Command provides advanced file management, application control, and batch programming.

The package's programming language is powerful, supporting if, then, else, do...while, and local

variables. You can do simple arithmetic and string manipulation on variables and access infor-



LOOK BACK: Take Command includes status information and a command history list.

mation about files at any time.

Take Command uses VxDs to run several DOS programs in a single window. Unfortunately, it only reads file associations from the WIN.INI file, while the Windows File Manager also uses the Registration Database.

Despite these minor irritations, Take Command provides the slickest DOS over Windows solution yet.

► **Take Command 1.0.** List price: \$49. Requires: 220K RAM, Microsoft Windows 3.1 or later. JP Software Inc., East Arlington, MA; 800-368-8777; fax, 617-646-0904. Circle 422 on reader service card

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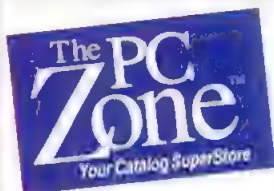
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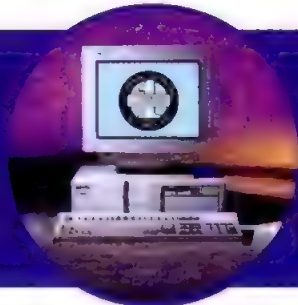
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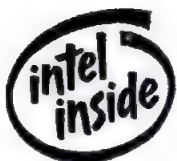
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- Integrated Desktop Management Interface (DMI)³
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¹Source: 1994 J.D. Power and Associates Desktop PC Customer Satisfaction Study. ²Study conducted among business users and based on 1,528 user respondents.
³**Feature included with some models. All HP Vectra PCs come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed; HP mouse and keyboard included.
¹U.S. list price, dealer prices may vary. Monitor not included. ²Other capacities available. ³First year on-site, 24-hour service. Second and third year return to dealer.
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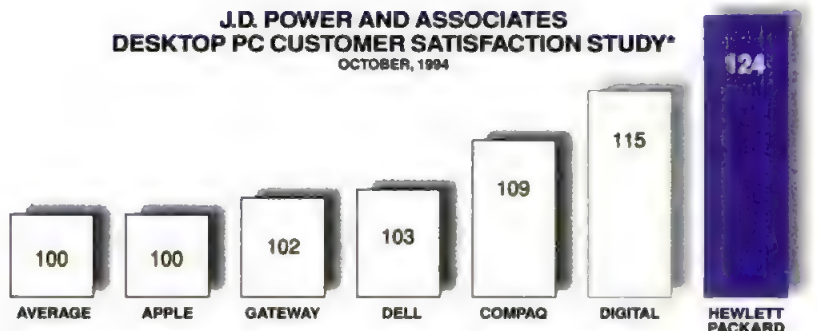
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- Integrated Desktop Management Interface (DMI)²
- Free three-year limited warranty for parts and labor²



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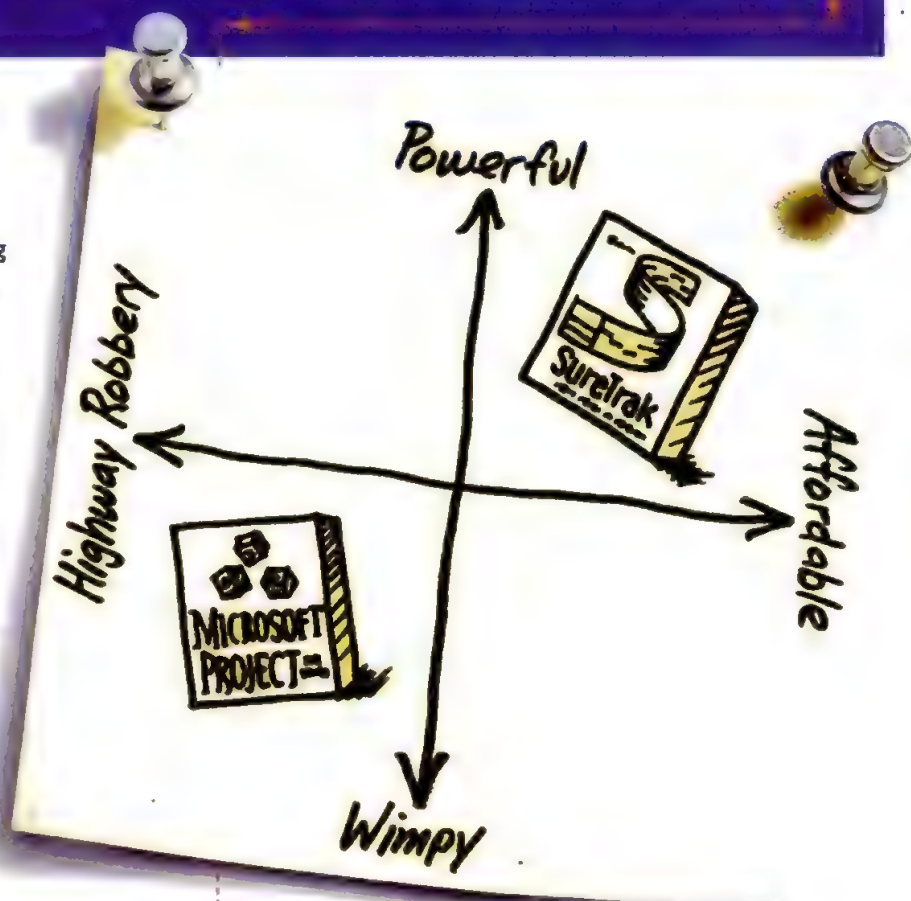
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NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Asa Somers

IMPROVED

A Multimedia Monitor of a Different Color

What's the one thing that almost all mainstream desktop monitors have in common? It's not resolution, refresh rate, or dot pitch. The answer: Just about all are *beige*. **Nokia Display Products** changes that with its new Valuegraph 447L *color* monitor. This 17-inch display targets the SOHO market with four new Europalette fashion colors as the icing on an otherwise very sweet cake. The 447L comes in red, blue, teal, and charcoal gray—in addition to the standard beige—to match your decor.

The color isn't simply painted onto the monitor's housing; it's actually poured into the plastic. As the low-cost version of the \$1,100 Editors' Choice-winning Multigraph 447X, the \$699 Valuegraph 447L features a flat-square tube with a 0.28-inch dot pitch and a maximum resolution of 1,024-by-768 at a 75-Hz refresh rate. It also includes Nokia's FullScreen feature, which eliminates the black border surrounding the picture and expands the viewing area by up to 10 percent.



HIGH TECH, HIGH FASHION: Nokia makes a monitor for every occasion.

Most impressive at this price, the Valuegraph 447L also comes with built-in stereo speakers for multimedia support. Its screen has both antiglare and antistatic coatings, and the unit is compliant with both VESA DPMS power-conservation and MPR II emissions standards. Solid-state controls, including degaussing and speaker volume and balance, are located on the front panel.

► **Valuegraph 447L.** List price: \$699. Nokia Display Products Inc., Sausalito, CA; 800-296-6542, 415-331-0322; fax, 415-331-6211.

Circle 406 on reader service card

HOT PROSPECT



Xerox 3000 Series Puts Print/Fax/Scan Devices Within Reach

Xerox Corp. has engineered its 3000 series of low-cost multifunction devices to combine printing, faxing, and scanning capabilities. The Xerox 3002, 3004, and 3006 are designed to meet the needs of SOHO and workgroup users, and they sell for less than \$2,000 each.

The units deliver 300-dpi ink jet printing and a maximum output of 3 pages per minute. The \$1,549 3002 includes a 9,600-bps data/fax modem, while the other two models support 14.4-Kbps transmissions. You can store up to 35 pages of outgoing faxes in the 3006's memory for transmission later, and the unit allows you to configure up to ten individual fax mailboxes.

The 3004 comes bundled with Delrina's WinFax Lite and Xerox's TextBridge software, both of which are offered as an optional upgrade kit (\$299) for the 3002 and 3006. The additional software adds optical character recognition (OCR) capabilities and allows users to send faxes directly from individual workstations on a network.

The 3000 series goes further than similar devices from Canon and Hewlett-Packard by allowing the scanning of documents. The units can copy documents of up to 99 pages, collate multipage documents, and reduce or enlarge pages to from 50 to 200 percent.

► **Xerox 3000 series.** List price: Xerox 3002, \$1,549; Xerox 3004, \$1,849; Xerox 3006, \$1,795. Xerox Corp., Palo Alto, CA; 800-832-6979

Circle 404 on reader service card

IMPROVED

trueSpace 2.0 Adds Built-In Support for 3-D Acceleration

The 3-D graphics and animation package trueSpace for Windows won one of our Technical Excellence Awards at Fall Comdex; the soon-to-be-shipping Version 2.0 of the product adds new features and support for 3-D acceleration APIs such as Intel's 3DR and RenderMorphics' Reality Lab. Such support will allow trueSpace 2.0 to take advantage of a new breed of 3-D graphics accelerators. Version 2.0 also adds solid-modeling capabilities, so you can render objects in real time rather than working exclusively with complicated wireframes. Caligari has built in advanced Boolean operations, video rotoscoping features, and field rendering. ViewSpace, a free-ware 3-D viewer that comes bundled with Version 2.0, allows any Windows user to view and interact with 3-D objects created in trueSpace or other graphics packages.

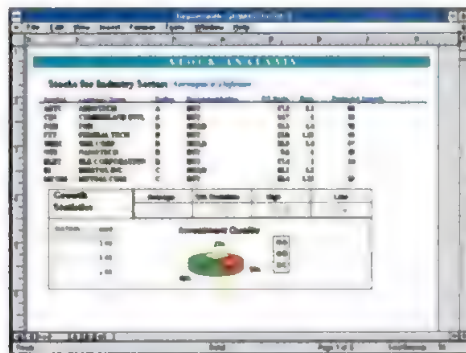
► **trueSpace 2.0 for Windows.** List price: \$795; upgrade from previous version, \$149. Caligari Corp., Mountain View, CA; 800-351-7620, 415-390-9600; fax, 415-390-9755.

Circle 407 on reader service card

IMPROVED

Borland Improves ReportSmith

Borland International will soon be shipping the latest upgrade of its reporting and query software, ReportSmith. The new release features such client/server enhancements as



With ReportSmith 2.5, you can cull data from outside databases.

New & Improved

master/detail reporting, which allows you to combine queries across heterogeneous databases in one report. ReportSmith, Version 2.5, also supports data dictionary functionality, which makes creating and editing reports more efficient by hiding database complexity from the end user. The data dictionary can be stored in any PC or SQL database, and it simplifies the user's view of the database with graphical tables and fields. ReportSmith comes in both PC and SQL versions, the latter containing a runtime viewer that lets users run reports even if they don't have a local copy of ReportSmith.

► **ReportSmith, Version 2.5.** List price: *PC version, \$99.95 (upgrade from previous release, \$49.95); SQL version, \$299.95 (upgrade from previous release, \$99.95).* Borland International Inc., Scotts Valley, CA; 800-233-2444, 408-431-1000; fax, 800-408-0001.

Circle 410 on reader service card

NEW

Take Your Show on the Road With CD Sound Studio

New Media Corp. has announced the release of the CD Sound Studio, a portable PCMCIA hardware device that combines a double-speed CD-ROM drive, a 16-bit stereo sound card, and two stereo speakers along with the integrated ACS3000 sound system from Altec-Lansing. Similar to the ZDS Z-Player (reviewed in First Looks, *PC Magazine*, November 8, 1994), this 4.5-pound device plugs into any Type II PCMCIA slot and sits underneath or alongside your notebook PC.

Volume and treble controls are located on the front panel, and jacks for external microphone, external speakers, line-in, aux, and subwoofer-out are located on the back panel. The CD Sound Studio plays 16-bit stereo sound at a maximum sampling rate of 44.1 kHz and comes bundled with Microsoft Sound System software. Despite everything the product includes, the \$799 list price may seem just a little bit too steep for most users on the go.

► **CD Sound Studio.** List price: \$799. New Media Corp., Irvine, CA; 800-453-0550, 714-453-0100; fax, 714-453-0114.

Circle 411 on reader service card



The CD Sound Studio delivers sound from under your notebook PC.

BRIEFS

Software

Tower Group International, a subsidiary of McGraw-Hill, has released TradeRef tariff and trade information software. TradeRef is comprised of four modules: the U.S. Tariff and Canadian Tariff base packages (\$595 each), the \$395 U.S. Customs Rulings package, and the \$395 NAFTA Rules of Origin package. The software, which includes U.S. and Canadian duty rates, customs rulings, and environmental restrictions, is sold on a subscription basis and is updated quarterly. 212-512-4453; fax, 212-512-2390

TeacherWare has introduced Version 3.0 of Grade Manager for Windows, a \$59.95 package that helps teachers keep tabs on their students' academic progress. This new version can graphically display a student's achievement on a Trend Graph, and it adds a new Template Editor, which automates the process of creating report templates. Grade Manager can follow up to 500 students and 350 assignments per class. 512-327-2661.

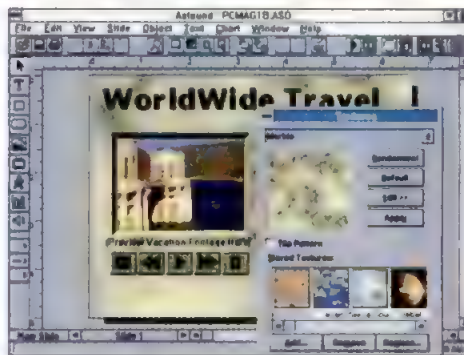
Explore OnNet, from **FTP Software**, is a commercial Internet package that has incorporated several new features since it was released last October. Explore OnNet (\$149) now supports MAPI, which allows you to send Internet e-mail directly from within all of the major Windows applications. The company has also provided a new Mosaic World-Wide Web browser designed to speed up access to information on-line. 508-685-4000; fax, 508-794-4488

The new low-priced font management software from **ElseWhere Corp.**, Font Works Express, includes 70 TrueType fonts. The \$19.95 package allows you to organize fonts into task-specific groups. You can hide rarely used fonts without actually uninstalling them. ElseWhere's Infinifont technology fits the entire package—fonts included—into a mere 1.6MB of disk space. The package accurately replaces missing fonts in documents and offers advice on the effective use of fonts. 800-357-3927.

IMPROVED

Astound 2.0 Beefs Up Its Multimedia Support

Business presentations are becoming ever more complex as users gain multimedia experience and insight. **Gold Disk** will soon be shipping Version 2.0 of its presentation package, Astound, which includes a number of enhancements with exactly this trend in mind. Astound 2.0 will let you place MCI commands—which trigger external devices such as laserdisk players or VCRs—into presentations. You will also be able to flag specific times during slides for the



Create more vibrant multimedia presentations with Astound's new Textures menu.

purpose of jumping to these devices. In terms of graphical enhancements, Gold Disk has added realistic texture fills such as clouds, flame, and stone, and allows you to rotate graphical objects completely. New Tips buttons appear in most dialog boxes to give you operating hints. Astound 2.0 will also allow you to add clip media to existing placeholders via drag-and-drop, or add a sound clip to any slide transition. ► **Astound, Version 2.0.** Estimated street price: \$200. Gold Disk, Santa Clara, CA; 800-982-9888, 408-982-0200; fax, 408-982-0298.

Circle 412 on reader service card

NEW

Multiprocessor Architecture Redefines the Six Pack

Intergraph Computer Systems has introduced its InterServe MP6 series of servers, featuring a new architecture that can take advantage of up to six 100-MHz Pentium processors to reduce bottlenecks and increase network performance. Each MP6 provides a megabyte of secondary cache, reducing the need to access main memory. Special cache modules that operate in what Intergraph calls



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New & Improved

burst synchronous mode provide zero-wait-state access to data. A newly designed memory bus from Corollary—called the CBUS II—provides a maximum sustainable throughput of 267 MBps, and the system's PCI bus handles disk access, along with a Fast/Wide SCSI-2 disk subsystem with support for RAID. The MP6's RAID subsystem can perform disk mirroring and stripping across an array of up to 48 disks.

► **InterServe MP6 series.** List price: *Dual-Pentium configuration with 64MB RAM, three 1GB hard disks, Microsoft Windows NT Server 3.5, \$44,900.* Intergraph Computer Systems Inc., Huntsville, AL; 800-763-0242, 205-730-5441; fax, 205-730-6188.

Circle 408 on reader service card

IMPROVED

01/FAX 3.0 Does Faxing and a Whole Lot More

01 Communicate Laboratory has begun shipping 01/FAX, Version 3.0, the latest release of its communications software package. 01/FAX contains its own contact manager, which allows you to enter data in ten user-definable fields and speed-search on just about

any combination of criteria. 01/FAX also includes a Graphics Editor for working with scanned-in art and logos; you can magnify an image up to 2,000 percent and edit pixel by pixel. Full fax capabilities are supported,

including automatic forwarding, redial, background faxing, and advanced fax-management features. The program is intelligent enough to distinguish between local and

long-distance calls, even when they share the same area code. The package comes bundled with 01/COM, a communica-

tions program that supports most major file-transfer protocols and helps you connect to a BBS or other on-line service, such as America Online or Prodigy.

► **01/FAX, Version 3.0.** List price: \$99. 01 Communicate Laboratory Inc., Mississauga, Ontario, Canada; 800-668-2185, 905-795-2888; fax, 905-795-0101.

Circle 409 on reader service card

BRIEFS

Software

Version 5.4 is the latest incarnation of Concordance for Windows, a search-and-retrieval package from **Dataflight Software** (\$995 for the single-user version, \$4,000 for the network version). Concordance's new Key Word in Context feature prints only the lines of text in which the search hit appears—a helpful feature when handling large documents. This version also adds fuzzy and wildcard searches, tabular views of retrieved information, and a report writer that will produce form letters with substitute text. 800-421-8398

Virtual Entertainment has announced IQ Test for Windows, which comprises a validated IQ test and an explanation of test scores. The \$14.95 program will place your score on a bell curve representing the scores of the general population, and a bookmark feature keeps track of difficult or unanswered questions. An expanded CD-ROM version of the product should appear early this year. 800-627-7752; fax, 617-449-4887.

Hardware

CompuAdd Computer Corp. has announced a new series of 486-based laptop computers. Designed to appeal to power users, both the DX2/50-based CompuAdd 450ns (\$2,495) and the DX4/75-based 475ns (\$2,849) feature 9.5-inch dual-scan color displays, 4MB of RAM (expandable to 20MB), 340MB hard disks (upgradable to 520MB for \$250), and removable floppy disk drives.



Each unit weighs 6.5 pounds, including the removable nickel hydride battery, which delivers up to 3.5 hours of use on a single charge. 800-627-1967

Ikegami Electronics (U.S.A.), maker of high-end video equipment, has introduced two new monitors, the \$2,495 21-inch CT-21B and the \$899 17-inch CF-17A. The CT-21B features a Dia-

NEW

Desktop Color Printing That's Light on the Budget

Offering three distinct color printing modes for variable output speed and quality, as well as an estimated street price of under \$1,000, the new SuperScript Color 3000 from **NEC Technologies** is a viable color printing alternative for budget-minded users. You can proof your prints in the faster thermal-transfer mode and then move up to either Graphic Color mode (variable-dot thermal transfer) or Photo Color mode (dye sublimation) for higher-quality final output. Bidirectional querying gives you on-screen access to many of the printer's key features and reports the printer's current status, including the print mode the unit is utilizing. NEC also provides four different levels of color matching: "enhanced color" for business graphics, "screen matching" for color photos, gray scale, and a default mode for applications with their own color-matching capabilities.

► **SuperScript Color 3000.** Estimated street price: *Under \$1,000.* NEC Technologies Inc., Boxborough, MA; 800-632-4636, 508-264-8000; fax, 800-366-0476.

Circle 417 on reader service card

NEW

What's in a Name? High-Tech Security, That's What

Cadix International has announced the new Cadix ID-007 security system, which controls virtual access to data or physical entry into facilities by verifying a handwritten signature. Using a pressure-sensitive pen and tablet, the Microsoft Windows-based ID-007 software checks three different criteria—the shape of the signature, the speed at which it is written, and the pressure of the pen stroke—in order to detect and reject unauthorized signatures, including forgeries. Signature verification typically takes less than 1 second.

The ID-007 security system learns individual signatures based on several samples, and can adapt to normal variations in a signature over time. It can even generate a report alerting the system administrator to changes in an individual's signature pattern.

► **Cadix ID-007.** List price: \$2,500; pressure-sensitive tablet, \$200 to \$2,000, depending on model. Cadix International Inc., Atlanta, GA; 404-804-9951; fax, 404-804-9949.

Circle 413 on reader service card

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"About time! Amen!"

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(QuickPay not available in Canada.) Credit card orders only. Please have your card ready. Offer for first time users only. International shipping extra. Offer expires 3/31/95.

*Also available: Version 2.0 for DOS. Does not include new WIN 3.0 features.

Windows system requirements: 386 or higher IBM compatible PC with 4 MB RAM Windows 3.1 or higher. 10 MB free space on your hard disk and a VGA or better monitor. Works with any printer supported by Windows. QuickBooks is a registered trademark of Intuit Inc.

New & Improved

NEW

Faster Data Transfer at Less Than Full Speed

Toshiba America Information Systems has begun shipping its two new XM-5201 series CD-ROM drives, which feature a new variable-speed playback system. This technology allows each drive to read data from the CD-ROM before the disk reaches its full spinning rate. Where most drives can only read data when the disk rotation is single-, double-, triple-, or quadruple-speed, the XM-5201 can read data when the disk is within ± 50 percent of each speed increment. The units deliver a data-transfer rate of 510 Kbps and a fast 150-ms random seek rate. The XM-5201 series also benefits from what Toshiba calls *digital servo control*, a feature that refines the tracking and head-positioning process. Each drive comes with a SCSI-2 interface and runs at a low 2.8 watts.

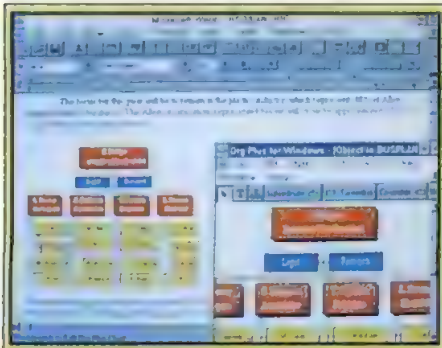
► **Toshiba XM-5201 series.** List price: *XM-5201B internal drive*, \$200; *TXM-5201D external drive*, \$275. Toshiba America Information Systems, Irvine, CA; 714-457-0777; fax, 714-457-0777.

Circle 416 on reader service card

IMPROVED

Org Plus Adds It All Up for You

Banner Blue Software has begun shipping Version 3.0 of its easy-to-use organizational charting package, **Org Plus for Windows**. New to this version is a feature that lets you



Thumbnail views and batch-printing capabilities are some of the new features in Org Plus 3.0.

define any field as an Amounts field and perform calculations within it. The program will recalculate formulas as the entries in these fields change. Org Plus 3.0 also adds a Network Aware feature, which allows multiple network users to view a chart, while only the first user to

BRIEFS

Hardware

mondTron CRT with a 0.31-mm aperture grill pitch and a maximum resolution of 1,600-by-1,200. A host of hardware- and software-based controls make the monitor fully configurable. The CF-17A comes with a flat-square tube with a 0.28-mm dot pitch and a 1,280-by-1,024 maximum resolution. Both Ikegami monitors are MPR II- and Energy Star-compliant. 201-368-9171; fax, 201-368-1305

Merritt Computer Products has introduced No Noise, a hardware component that installs inside your computer between the fan and the power supply board and monitors the computer's internal temperature to regulate fan speed. As a result, the fan spins only when necessary, reducing the noise your computer makes. The \$49.95 component has a safety circuit that automatically brings the fan up to full power in the event of a malfunction to insure that your computer is never left without cooling. 214-339-0753; fax, 214-339-1313.

Thomson Consumer Electronics has developed the Wireless Phone Jack System, which turns any ordinary electrical outlet into a phone jack, allowing for multiple telephone connections in a single home or office without rewiring. The system relies on a \$99 base unit that plugs into an electrical outlet near an existing phone jack. Once the base unit is plugged in, you can turn an unlimited number of electrical outlets into phone jacks using \$49 extension units. The system uses one of 65,000 codes, securing the base unit from interference by another party. 800-409-5111.

And Finally...

NEC Technologies has lowered the price of its Versa S series of notebooks, reducing the cost of some units by as much as \$1,000. . . **Lotus Development Corp.** has begun shipping many of its software packages, including SmartSuite 3.0, on CD-ROM. Users who purchase the CD-ROM-based versions will find that Lotus has not just changed the distribution media but also included added multimedia capabilities.

open it can make changes. Date-stamp capabilities, thumbnail views, and a Make Fit feature that automatically fits your chart onto one page round out Version 3.0's new offerings.

► **Org Plus for Windows, Version 3.0.** Estimated street price: \$140; upgrade from earlier versions, \$49.99. Banner Blue Software, Fremont, CA; 510-794-6850; fax, 510-794-9152. Circle 418 on reader service card

NEW

PCMCIA Card Does Double Duty

As part of its MediaMate series of multimedia PCMCIA products, **Cardwell International Corp.** has developed the Sound/SCSI-2 card, which enables the use of CD-ROM-based programs that include sound. The card features 16-bit data transfer at a maximum rate of 10 MBps over a SCSI-2 connector. It is fully compatible with DOS, Windows, and NetWare and comes with a host of device drivers. The sound portion of the card contains a 16-bit DAC with a sampling rate of up to 44.1 kHz, a software-based volume control, a synthesizer with built-in OPL3 FM logic, and an on-board mixer. The \$369 unit is hot-swappable and includes inputs for a microphone, CD-ROM drive, and MIDI instrument, as well as a stereo output jack for external speakers.

► **Cardwell Sound/SCSI-2.** List price: \$369. Cardwell International Corp., Folsom, CA; 916-985-1880; fax, 916-985-1899.

Circle 414 on reader service card

NEW

Two SCSI-to-PCI Controllers Hit the Market

CMD Technology has announced a pair of high-performance SCSI-to-PCI controllers: the noncaching CSA-6500 and the CSA-6520, which supports from 4MB to 64MB of user-installable cache. Both units include Windows FastDisk driver support, which lets you expand the number of windows available while still operating each at optimal performance, plus QuickSCSI software, which helps the integration between the PCI bus and any SCSI device. Both units also support command queuing and up to seven SCSI IDs and eight logical unit numbers per ID. The controllers interface with SCSI-1, SCSI-2, Fast, and Fast/Wide peripherals.

► **CMD CSA-6500.** List price: \$359. **CMD CSA-6520.** List price: \$595. CMD Technology Inc., Irvine, CA; 818-757-0070; fax, 818-757-0083.

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It's a Proxima Desktop Projector.[™] It connects to your computer and projects large-screen images. Anything from simple graphics to full-motion multimedia presentations. And yes, you need one. Because with it, you can communicate more effectively and more efficiently than ever before.

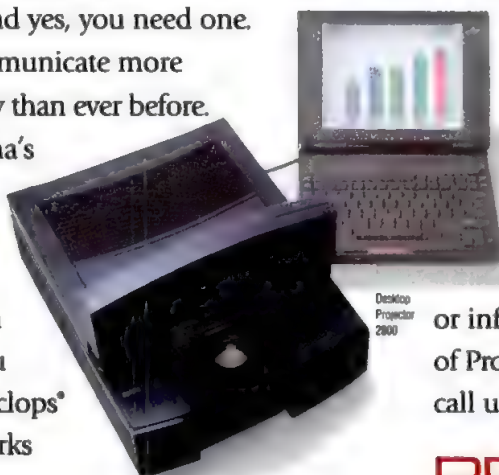
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like a cordless mouse to give you total control of your software from anywhere in the room. Any software, any presentation, any platform.

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CIRCLE 140 ON READER SERVICE CARD

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Z:NOTEFLEX. The One



Computer For All Of You.

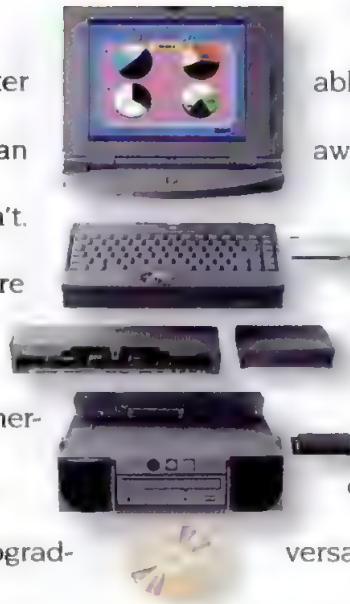
Decisions, decisions.

Finding a notebook computer is simple. But finding one that can handle all the things you do, isn't.

If performance is what you're after, you look for megahertz and megabytes—the more the merrier. If you want a computer that won't be obsolete tomorrow, upgradability and modularity are key features. And if you need long battery life, well, cross your fingers.

And what if you want it all?

No problem. The Z-NOTEFLEX™ from Zenith Data Systems, delivers high performance in a completely modular notebook package. The video display, hard drive, floppy drive, memory and the microprocessor are all user-configurable. And changing them is as easy as changing your mind.



Take, for example, the removable floppy drive. Whenever you're away from the office, pop it out and insert a second battery pack in its place. Wham, twice the computing time!

But that's ZDS for you. Who else would build a computer versatile enough to tackle virtually every part of your job? After all,

Connected Computing—making computers and people work better together—is what Zenith Data Systems is all about.

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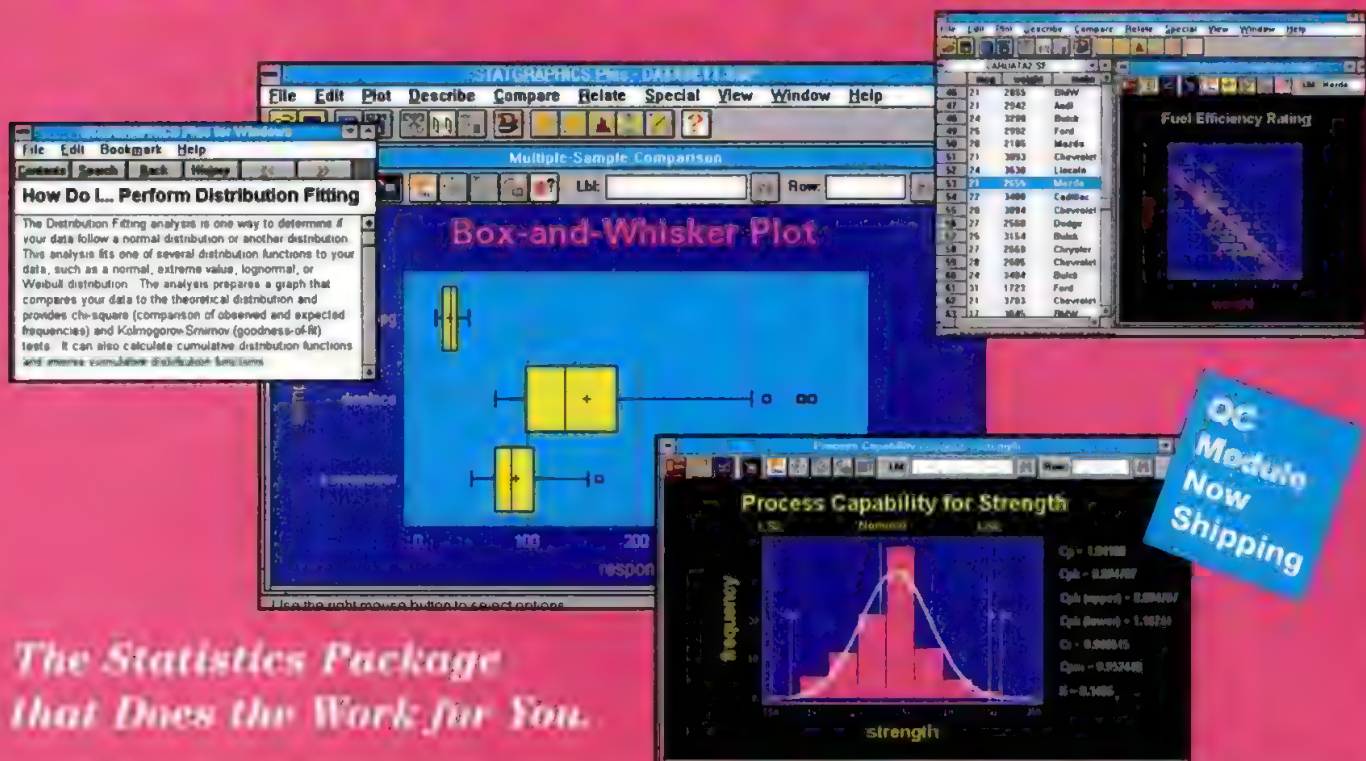
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Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

Learning to Piece Mosaic Together

BY RICK AYRE

Mosaic for Windows, the Web browser that makes access to the Internet so easy, has generated a lot of hype. And now it's generating books as well. Reviewed here are four of the first Mosaic books, and though each holds good news for future Mosaic users, none stands out as the definitive Mosaic text.

A HANDBOOK...

The Mosaic Handbook for Microsoft Windows, by Dale Dougherty and Richard Koman, is clear, concise, direct, and just a little bit technical. The book comes with a Spyglass-enhanced version of Mosaic, giving it an advantage over its competition. It offers just the right mix of instructions on how to use Mosaic, the Web, and the Internet and does a nice job of describing the breadth of services available.

Since *The Mosaic Handbook* comes with a version of Mosaic, its directions can be very explicit. It also has the distinct advantage of having been written by Dougherty, who is the publisher of the Global Network Navigator—O'Reilly and Associates' venture into electronic publishing. The book is very specific both when giving directions to get you on-line and when telling you what to do once you get there.

A GUIDE...

Mosaic User's Guide, by Bryan Pfaffenberger, deals with using

the original NCSA version of Mosaic, but because it covers the Windows, Macintosh, and X Window versions of the program, it tends to be less specific in many of its directions. Where it must be specific, it is, but since it describes how to use each version of Mosaic, only a third of the presented information is relevant—depending on which platform Mosaic is run.

Mosaic User's Guide also comes with bundled software. On the included disk is NetManage's Chameleon Sampler, a software bundle that enables SLIP/PPP connections to the Internet. Also included are programs that let you use e-mail, newsgroups, and FTP, as well as a preview of a really intriguing MAZE that's implemented using documents written in HTML, the format Mosaic can view. Mosaic itself is not included, unfortunately.

A TOUR...

Mosaic Quick Tour for Windows, by Gareth Branwyn, is the manual that should come with Mosaic. Just as Mosaic is fun to use, this book is fun to read, and it can get you up

and running fast. For those of us in a real hurry, there's a section in the introduction called the Super-Duper Mosaic Quick Start, which tells you how to get started so quickly you can almost get there before you start.

For the most part, Branwyn sticks to the Mosaic essentials.

He does, though, cover the cool stuff and manages to find the right level of detail to keep you interested and give you the guidance you need. The layout of the book helps in this regard, as information is made accessible in context. Also, Branwyn's suggestions for places to explore are more interesting than the ones found in the other books reviewed here.

AND A TECH-BOOK

The Internet via Mosaic and the World-Wide Web, by Steve Browne, is the most detailed and technical of the four books reviewed here. Its many tables and charts contain valuable information that the authors of the other books chose not to cover. Unfortunately, the book's layout is downright ugly. Browne's lists of places to visit are pretty good, though.

In summary, *The Mosaic Handbook* is the best Mosaic book in this bunch. But if you're not already familiar with Mosaic, then *Mosaic Quick Tour for Win-*

dows is a good (as well as a fun) place to start.

Mosaic User's Guide, however, is the one you want if you need information about the Macintosh or X Window version of Mosaic. And if you're looking for good technical information,

The Internet via Mosaic and the World-Wide Web contains very detailed charts that you'll most likely find quite helpful.

► **The Mosaic Handbook for Microsoft Windows**, by Dale Dougherty and Richard Koman, \$29.95; O'Reilly and Associates Inc., 800-998-9938. ISBN: 1-56592-094-5.

Circle 448 on reader service card

► **Mosaic User's Guide**, by Bryan Pfaffenberger, \$24.95; MIS Press, 800-628-9658. ISBN: 1-55828-409-5.

Circle 449 on reader service card

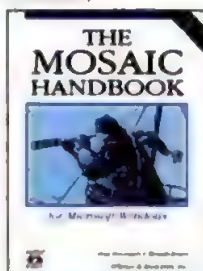
► **Mosaic Quick Tour for Windows**, by Gareth Branwyn, \$12; Ventana Press, 800-743-5369. ISBN: 1-56604-194-5.

Circle 450 on reader service card

service card

► **The Internet via Mosaic and the World-Wide Web**, by Steve Browne, \$24.95; Ziff-Davis Press, 800-688-0448. ISBN: 1-56276-259-1.

Circle 451 on reader service card



Read Only Recommends

Looking for a job is hard work. Why don't you put those newspaper want ads aside, clean your ink-stained fingers, and get on-line? After all, this is the age of electronic information, so let James C. Gonyea's *The On-Line Job Search Companion* help you find the thousands of up-to-date job openings that are listed on-line. \$14.95; McGraw-Hill Inc., 800-227-0900. ISBN: 0-07-024068-X.



As usual, Team Dennis Conner is well in front of the competition. But then, they have a history of firsts. In 1980 it was the Kevlar sails. In 1987 an innovative hull surface. In 1988 a sail that looked like an airplane wing. All of which resulted in America's Cup victories.

Of course 1995 should be no exception. Because DC has a new secret weapon: Microsoft® Excel 5.0.

With the leading spreadsheet for Windows™, Conner's design team has the flexibility and power to calculate

the results of thousands of test factors to determine an ideal boat design. Make the wrong choice and his team spends the rest of the race looking up somebody's boom. (Sound like your business?) Make the right choice and they're ten seconds faster than the next guys.

That's where IntelliSense technology comes in. Like any good team member, it knows what to do before it's asked, making tough jobs easy. And simple jobs automatic. So now, things like PivotTables and queries turn spreadsheet data into

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HE'S ALREADY

12.5 SECONDS

AHEAD IN JANUARY

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useful information, and help you see what the other guys miss. The shortcuts.

To put a little distance between yourself and the competition, call (800) 240-4782 Dept. XQV, and we'll send you information on Microsoft Excel 5.0 and the other programs that make up our winning team of Office applications.* After all, the race you're running probably isn't much different than Dennis Conner's. Because in the end, the only thing that matters is being at the last buoy first.



Microsoft

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At Xircom, heaven help us, we've just created the fastest CreditCard Ethernet adapter ever made.

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We must confess, this card has tested a blistering 60% faster than its closest "competitor" (for want of a better word), and up to 120% faster than other cards, **FULL DUPLEX** in some environments.

All thanks to our advanced, Look-Ahead Pipelining and unique full duplex capability. Which increases the raw data rate of the network. More importantly however, this

Check out the facts. You will surely find that what comes standard from Xircom makes our new, faster LAN adapters anything but standard.

CHECKLIST	Xircom	Others
Full Duplex Support	YES	NO
Advanced Power Management	YES	NO
Suspend/Resume Support	YES	NO
BIOS, Windows, OS/2, NT & Unix Support	6	?
Card & Motherboard Certified	70+	?
Network Operating System Support		
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allows you to send and receive messages at the same time.

All this amounts to one thing: Pure speed. Pure, unprecedented, pressed-back-in-your-office-chair kind of speed which not only makes your applications scream, but your colleagues whisper.

But the temptations don't end there. Xircom also offers you a new Performance Series Token-Ring CreditCard. And every Performance

For a complete copy of our third-party test results, just call us at 1-800-775-0400 and request document #7001. Or if you'd like to receive our performance white paper, simply request document #7002.

Series product is guaranteed to be compatible with every make and type of notebook. Additionally, they come with the widest range of NOS support available. Along with unmatched ease of use — as an example, our new Windows-based installation program gets you up and running in under one minute.

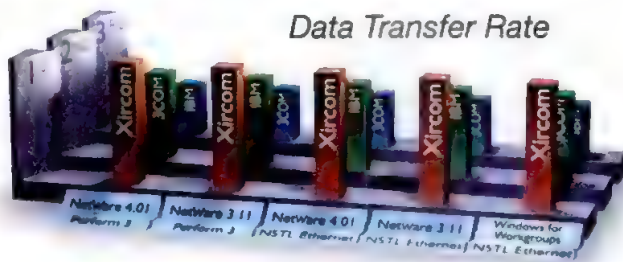
With all this, it's no wonder that Xircom has connected over two times as many notebooks to LANs

as all other LAN adapter vendors combined. In fact, there are already over a million satisfied Xircom LAN adapter users throughout the world.

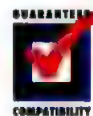
Our rigid quality control along with our comprehensive spectrum of tests ensure that every Xircom LAN adapter will stand up to the

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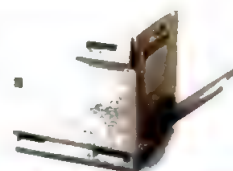
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Michael J. Miller

print publications will be around for a very long time. But make no mistake about it: Print has to change.

THE FACE OF NEW MEDIA

The availability of nearly instantaneous news on radio and television changed the way people read newspapers; television changed the way we listen to radio; cable systems changed network television. The way we know both print and television will change because of the electronic publishing revolution. We don't know how just yet, but we can be sure that changes will happen.

One thing I think likely to happen is that you'll see more publications tailored to special interests. The availability of television as a mass-market source of news and entertainment led to the demise of several huge, general-interest magazines but paved the way for an even larger number of special-interest publications to emerge. Radio broadcasting was similarly affected by the rise of television, the result being the cre-

ation of more specialized radio stations. In television, the advent of cable led to an erosion in audience for the big networks, but many more specialized television networks began to appear.

In publishing, we sometimes refer to this phenomenon as *narrowcasting* (as opposed to broadcasting). The availability of enormous quantities of information transmitted over new computer-based media seems likely to promote this phenomenon.

It won't be just professionals, or large established publishing houses, that will take advantage of electronic media. This new media also breeds opportunity for small businesses and private entrepreneurs. Just as desktop publishing led not only to higher-quality publications but also to an explosion in the number of newsletters and magazines, electronic publishing tools will allow far more people to begin publishing electronic information.

With many of today's tools, any of us can publish material by sending it directly to other computer users or by posting it on corporate networks, CD-ROMs, commercial on-line services, and of course, on the Internet.

Electronic publishing tools give us the

ability to reach a large audience easily. The end result: more information available to more people. A lot of this information will be helpful, some of it won't be. That's all part of the idea marketplace.

REVOLUTION IS IN THE AIR

If properly used, these electronic publishing tools will make us rethink the way we get and give information in the future. We'll be able to extend the experience of our favorite magazines and television shows by using interactive media. And we'll be able to publish our own information, electronically, much easier than ever before.

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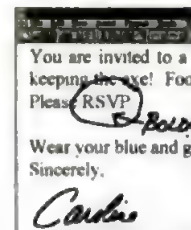
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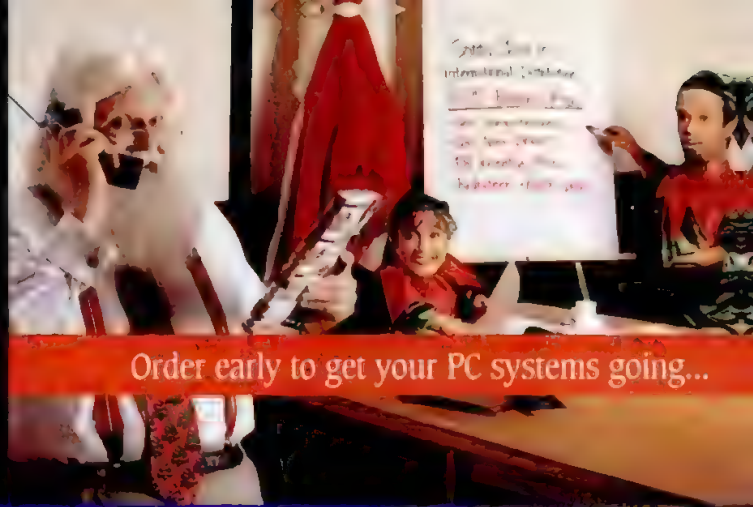
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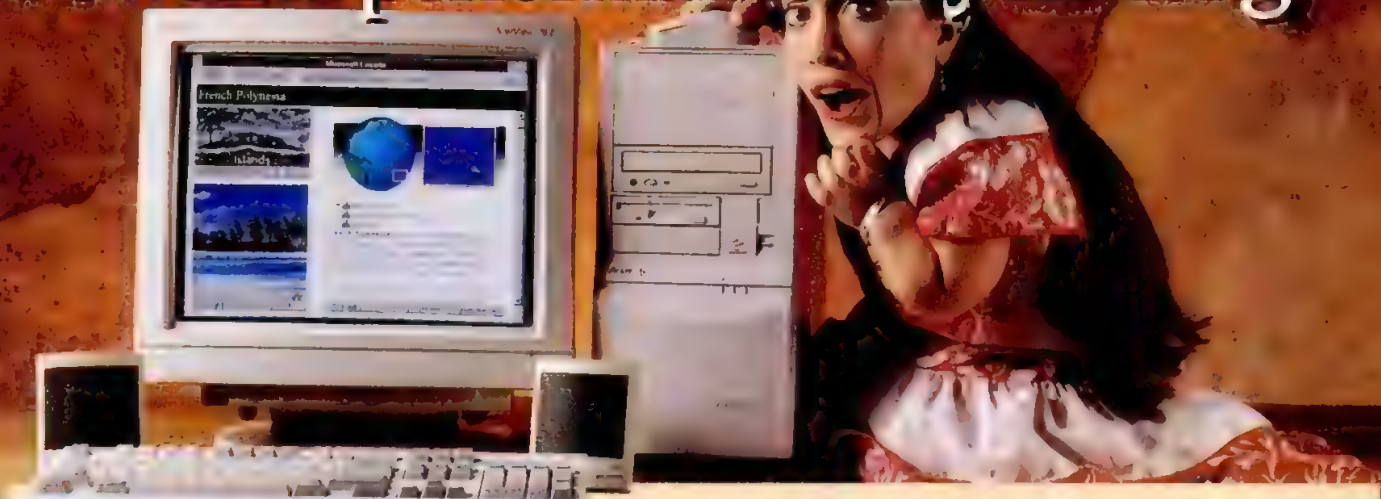
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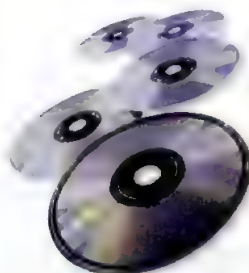
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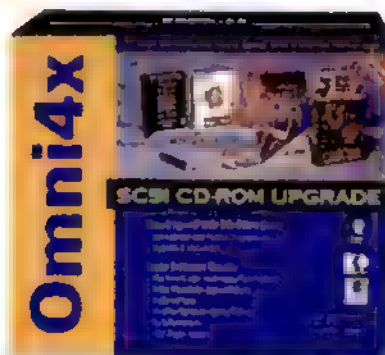
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Bill Machrone

On-Line Reality: Alternate Universes

I'm as big a booster of the on-line lifestyle as anyone. I've been on-line since 1979 and have had a world of good experiences. Now that virtually anyone can get on the Internet, on-line fever has reached new heights. On-line services have more members

than ever, yet they seem less crowded than they have in the past—for two reasons. First, the services have vastly upgraded their networks and host machines to meet the demand, so large numbers of users don't bog you down. Second, there are far more places to go, whether newsgroups, forums, Web servers, FTP sites, or chat rooms, so the number of messages posted in any one area may be declining, while the overall number is rising dramatically.

Because of the variety in places to go, things to download, and people to chat with, every user has a potentially different experience, much like the blind men and the elephant. And we are functionally blind on-line. No one can see all the services or even have a cogent overview of them.

A BRAVE NEW WORLD

If you haven't already delved into this brave new world, you should know that they're not telling you everything. First and foremost, one size does not fit all. You have to know what you want in an on-line service, then choose one (at least one) that gives you the most of what you're looking for. Prodigy, for instance, is still the most family-oriented of the services, with most forums moderated by someone who removes the graffiti and keeps messages from getting out of hand. CompuServe's sysops do much the same thing. America Online has gotten much better in this regard, but the chat areas still seem to have an out-sized share of despondent and oversexed teenagers. GENie, the smallest of the "big" services, has some unparalleled technical areas, such as PSRT, the PostScript round table, moderated by the incomparable Don Lancaster, hacker extraordinaire.

Very few of the discussion groups on Usenet, by contrast, are moderated. You subscribe, you post, and maybe you get flamed if you offend one of the regulars. Other than that, anything goes.

These services are all text-based, although all have added graphical icons and logos. The World-Wide Web, by contrast, is inherently graphical. Unfortunately, it was designed and built by people with fast workstations connected to the Internet at high speeds, typically several hundred kilobits to several megabits per second. I have a 64-Kbps connection at work but only a 14.4-Kbps modem connection at home. The difference is dramatic. Those beautiful graphical images that grace the home pages at work are a curse coming across at modem speeds. Many home pages are only a couple of thousand bytes' worth of text, but the images can push the total page size to over 100K. I want—no, I need—a cable modem. Ten Mbps would be just about right.

All the line speed in the world, however, won't make the sites run any faster. Popular sites may run on huge computers with enormous bandwidth, yet they're swamped with users. Crisp performance on Sunday night can be a slog through quicksand on Monday morning. In

Web sessions, you don't really log on to another computer. Instead, your machine sends a request for a given page or file, which then comes over the line asynchronously. You're connecting and disconnecting constantly. The cool thing about the Web is that the highlighted words or phrases are hyperlinks to servers all over the world. The Windows-based Web browsers I've seen don't let you do anything until the entire image arrives: Surfing the net is like draining and refilling the bathtub each time you want to go somewhere.



*From the open-ended Internet
to the visible horizons of
CompuServe, one size does not fit all.*

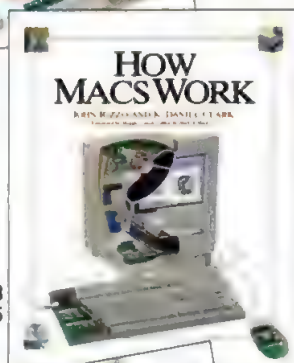
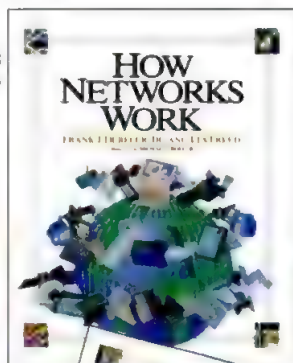
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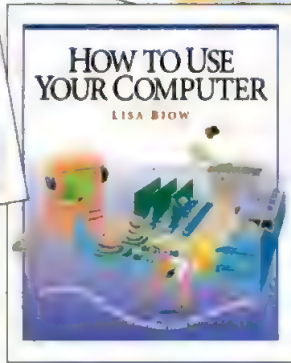
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Bill Machrone

BETTER BROWSERS

A pleasant exception is WebExplorer, the browser that comes with OS/2 Warp's Bonus-Pak. Actually, you have to download the browser (as of this writing), because it's still in beta test, but you get the rest of the Internet connectivity stuff you need on the CD. The programmers have made excellent use of OS/2's inherent multithreading by allowing you to move around the page as soon as the text arrives. WebExplorer has other neat features, such as a map of your travels. As is the nature of the Web, you often don't realize that your session has been hopping all over the country and spanning oceans.

Another problem with the Web is the naming conventions. They make it relatively impossible to remember the name of all but a few of the servers, so the only way you can find something is by finding a reference to it. The browser then logs it in a "favorite places" file. It took me several hours, for instance, to find the current home of the LEGO home page (<http://legowww.itek.norut.no/>) for my son, Andrew. Finding it was a process of running down a number of leads with a variety of indexes.

The open-ended nature of the Internet can make you yearn for the visible horizons of CompuServe. The difference in the economics is interesting, however. Most of the Internet providers charge from \$20 to \$40 per month for either unlimited access or a healthy amount of connect time. For example, NetCruiser—a Windows-based package from Netcom, a national Internet provider—provides 40 hours of prime time and hundreds of hours after midnight and weekends for \$20 per month. Contrast that with the pay-as-you-go nature of CompuServe. If you log onto several forums each day and spend time reading the messages on-line, your bill could be between \$100 and \$200 per month. Many members use off-line readers that take the cost down to \$50 or less.

Then there are the venerable, ever-changing bulletin board systems. Graphics have become prevalent, and some, like Galacticomm, have even gone to a client/server architecture with a Windows front end. BBSs are all some users ever need. I have friends who have never been on a commercial service yet are on-line all the time. They may be in for a shock one day when they find out that their local BBS has become an Internet provider. Everything that rises must converge. □



The squadron of 64-bit graphics accelerators from ATI — the GRAPHICS PRO TURBO, WINTURBO and GRAPHICS XPRESSION — has landed. Affordably priced from only \$179, they're attacking computers with rocket-like performance, laser sharp graphics and galactic true colors.

Hi-res, True Color Galaxies

Resistance is futile. High resolutions of up to 1280x1024 and 16.7 million true colors will overwhelm you. These advanced accelerators propel applications faster in true color than other cards using just 256 colors. And the superior performance, up to 42 million Winmarks*, will conquer even the most complex applications. Plus, the flicker-free display — at up to 100Hz — reduces eye-strain over prolonged periods of attack.



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Armed with an arsenal of utilities to enhance Windows, the mach64 graphics accelerators breeze through Windows applications quickly and effortlessly. The unique WinSwitch feature allows color and resolution to be changed *without restarting Windows*. A stellar range of software drivers enable popular operating systems to be explored — OS/2, UNIX, Windows NT, CAD, DOS and others.



WinSwitch

Change resolution and color without exiting Windows

Beam up an ATI 64-bit graphics accelerator today. There's one to meet every application, budget and bus type. They're light years ahead of other accelerators.

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* WinBench 4.0 and PC Bench 8.0 performance tests done on a Pentium 90MHz, 16MB RAM, 256K cache, 420 MB HD, using 2MB and 4MB PCI graphics cards. WinBench 4.0 at 1024x768/256 colors (large fonts) and 800x600 in 16.7M colors (small fonts) at 70Hz refresh rate.

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Invasion of the 64-bit Graphics

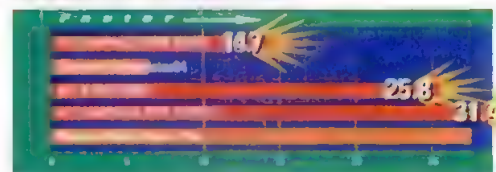
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OTHER FEATURES

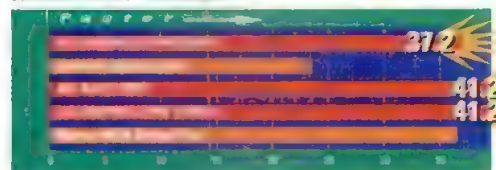
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WINBENCH 4.0 - 16.7 million colors



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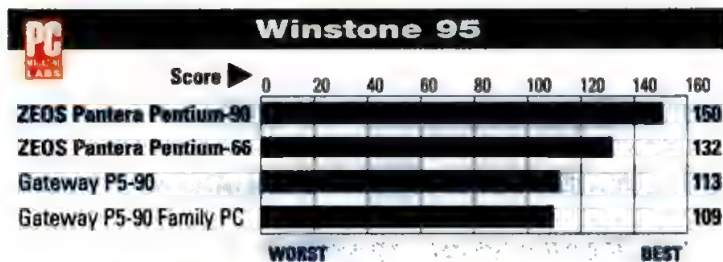
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John C. Dvorak

Comdex '94 by the Book

Every year I like to see which industry trends can be spotted by leafing through the *Comdex Program & Exhibits Guide* and comparing its contents with that of previous years' guides.

Page by page, reading the Comdex guide offers as many insights into the show as walking the floor, and it's much easier on the feet.

You can best understand the 1994 show and its future by looking at where we left off in 1991 and forgetting about all that happened in 1992 and 1993. While attendance for the 1994 extravaganza, at 190,000 or so, was a record, the number of pages in the Comdex guide shrank to 630, down from 706 in 1993, and down from the 1992 all-time high of 724. This indicates that there are fewer products, and that the industry is in the midst of a consolidation—and perhaps even a downturn.

The most interesting changes—those that show what's hot and what's not—were reflected in the sheer number of exhibitors in certain categories. There was a drop-off in Video Accelerator Boards, down from 39 in 1993 to 19 this year; Pen-Based Computing dropped from 21 to 13; and Printer Font Developers are dying on the vine, dropping from a mere 5 exhibitors in 1993 to a minuscule 3 in 1994.

Most other categories remained rather stagnant over the past several years. Multimedia showed some consolidation but not as much as I expect to see eventually.

One of the most notable gains this year was in telecommunications. Back in 1991, the Data Communications index category was eliminated. Oddly, this coincided with the introduction of my telecommunications book and warnings from New York publishers that modems and telecom were dead. Now it seems all they do is publish Internet books and drool over 28.8-Kbps modems. To reflect this, 1994's Fall Comdex saw the revival of the Communications category, albeit with a shorter name. There was a proliferation of communication subcategories, including Communications I/O (35 exhibitors), Services

(21 exhibitors), and Modems (51 exhibitors).

New categories are the ones to watch for growth at future Comdex shows. Workgroup Computing sported 25 exhibitors, and the sudden emergence of Voice Recognition attracted 10 exhibitors. Video Digitizing appeared out of nowhere with 35 exhibitors, many at Comdex for the first time.

Last year, the following big-picture trends caught my eye: the continued proliferation of clones, the growth of networking, the growth of multimedia, and the reemergence of the home PC. This year, the PC industry's hot buttons include the tremendous growth of the Internet and telecommunications, the reemergence of groupware, and the coming-of-age of voice recognition. The last one, voice recognition, is the real sleeper here because it has the ability to transform the way we interact with our PCs.

Years ago, the only trends were computer-centric—notebooks, add-in upgrades, and motherboards. Now we're seeing multiple trends proliferating. I have to say that I've never seen so many trends at once. We're seeing fragmentation similar to that accompanying the dissolution of the former Soviet Union and of Yugoslavia. Call it the balkanization of the computer business, but

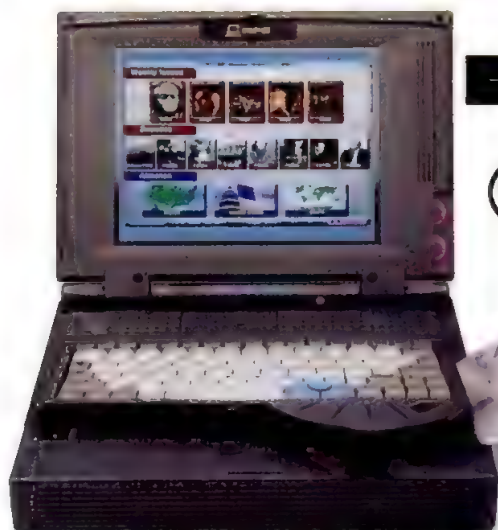
it seems that things are getting busted up. It's a creepy theme that's just now having an effect on the computer industry. Long-term, it could well change Comdex as we know it as vendors search for more cost-effective and more focused shows to display their wares.

Next year's show will tell the tale. In the short history of Comdex, there has never been a three-year decline in the catalog's page count. Come next year, I'll be counting pages again. We'll see if the shrinkage continues. After all, the Comdex guide does not lie.



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Inside Track

T

hey Recall Automobiles, Don't They?

Dept.: While Intel has finally admitted that there is a **flaw** in the Pentium processor's floating-point unit, the **intensity of the complaints** on the Internet has proliferated with example after example of how to make the chip pro-

duce errors and how the company should replace all the chips they have already sold. One journalist attempting to play down the problem said that the chip makes a mistake once every few **billion calculations**.

Let's see. The 60-MHz Pentium can crank out about 100 million instructions per second. So, let's say we're trying to make a mint in derivatives and doing nothing but number crunching. Given the right conditions, the flaw in the Pentium's floating-point could make an error every several minutes. Gee, isn't that confidence-inspiring!

Still, Intel got very **defensive** about the floating-point bug, saying that a mistake would occur only under very specialized types of operations and is likely to happen only once every 27 years. According to one Intel spokesperson, "[Failure] would require an elapsed time of use longer than the mean time to failure of the physical computer subsystems." In other words, Intel's line is that the error rate a user would likely experience from the Pentium's floating-point problem would be overwhelmed by other more probable computer failures.

Needless to say, I found this comment self-serving for Intel. It indicates that **discovery of the problem is just about impossible!** I mean if the computer itself is statistically more likely to fail before the occurrence of a miscalculation, then how come people can generate documented miscalculations? And how did someone stumble onto it after the Pentium processor has been available for only about two years? Am I missing something here?

The error was originally discovered by Thomas Niceley, a mathematics professor at Lynchburg College in Virginia. **Kudos to him.**

Intel says present production of Pentium processors is bug-free and that it will **replace** chips sold to those heavily into scientific calculations and likely to have problems. Kudos to them. I suspect a few squeaky wheels with flawed chips will get **replacement CPUs**.

Genuinely Interesting Software Dept.: If you've noticed that the Windows Find feature is a **little flabby**, then take a look at the \$20 File Finder for Windows from Public Software Library (713-524-6394). And if you are not on the Public Software Library mailing list—get on it!

*The big deal is
that in fact, it's next
to impossible to sell
Windows software
through normal
retail channels without
the Windows logo—
and Gates surely
knows this.*

Bill Gates Watch: Microsoft's generalissimo, Bill Gates, seemed a **little edgy** when he was recently interviewed by the weekly computer trade magazine *InfoWorld*. An argument between *InfoWorld* and Gates seemed to arise over Microsoft's "forcing" vendors to **code their Windows 95 applications to run on Windows NT** in order to use the Windows logo for their Windows 95 products. What **stunned** me was a disingenuous remark Gates made. "We're not forcing them to do anything," said Gates. *InfoWorld* replied, "But you are asking them to meet a certain criteria before they can use the Windows 95 compatibility logo." Gates responded, "Who needs the logo? It's our logo. . . . We own the

logo. . . . They don't need the logo. . . . They can sell their software without the logo. So what's the big deal?"

The big deal is that, in fact, it's **next to impossible** to sell Windows software through normal retail channels without the Windows logo—and Gates surely knows this. All the vendors I've talked to have complained to me that without the Windows logo their products could be dead in the water. The fear is that retail-store personnel (who are variously described as **boobs and morons**) will not put the product in the Windows section of the store. "It'll end up over in the corner with DOS programs or stuck in a miscellaneous section with the Amiga and Atari word processors," I'm told.

Microsoft is not to blame here. The company promotes the logo not only to the public but also to software retailers. It would be next to impossible to use even the term Windows on the box without Microsoft's permission, since the company has **protected the name**. So how can a software company expect to sell a Windows anything without Microsoft's permission?

This pattern of control goes back some years. In 1985, when the **Software Publishers Association** tried to promote a standard box-labeling color-code scheme, Microsoft **refused to participate**, and the innovative program died. By 1987 only a few consumer-oriented companies, such as Broderbund Software, were still hanging on to the dead standard.

But I can't get too worked up about this licensing nonsense, because I believe Microsoft is actually doing the vendors **a favor** by making them code their applications to run on NT as well as Windows 95. But at least they should be honest about it. Then again if Gates said something like, "We're having them code for NT because developers are too dopey to know what to do from one minute to the next," this degree of candor might draw a little too much of the wrong kind of attention. □

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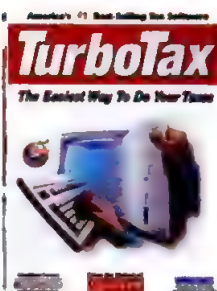
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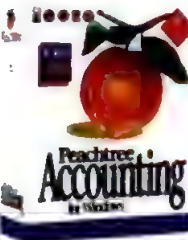
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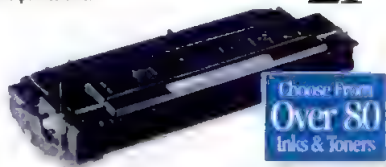
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The 45-page review for *Software Digest* covered all the bases. It was the most extensive review ever done on remote control software. In the end, the experts called ReachOut Remote Control simply "the best program in the...evaluation." It outscored the competition in not one, not two or three, but in seven categories. In its report for *Software Digest's* June '94 issue, National Software Testing Laboratories wrote:

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Jim Seymour

IR: Fast, Cheap, and Soon Ubiquitous

One of the important but little-noticed trendlets at Comdex last November was the flurry of announcements by exhibitors of new infrared wireless connectivity products.

I guess I shouldn't be surprised by the lack of attention. Some

people will never forgive infrared (IR) for being used in the IBM PCjr a decade ago. IBM linked the PCjr's keyboard to its system unit with an IR transceiver rather than the traditional coiled cable. The idea flopped as badly as did the PCjr itself.

But hey, look. It wasn't infrared's fault; it was IBM's. This was a classic example of a design born to fail. Using infrared to move keyboard commands made trivial use of the technology, it didn't work very well, and it met no discernible customer need. Three strikes and you're out.

Infrared links subsequently appeared in some slow-selling mini-LAN devices, then more noticeably in Hewlett-Packard's pace-setting subnotebook, the OmniBook 300. HP's design worked well enough, but matching desktop-based infrared receivers appeared in only a few slow-selling HP-labelled PCs. Those who'd doubted the usefulness of the OmniBook IR link sat back, satisfied that they'd been right all along.

But infrared is a superb means for transferring data, and I think those vendors in Las Vegas who talked IR, and those who showed new IR-based products, will find greater success than recent history suggests.

The big impediment to IR's success as a PC data-transfer medium has been the lack of standardization. For example, you could use an OmniBook only with those few HP desktops with IR transceivers as well as a handful of third-party printer accessories. What we've needed—and now, what I think we finally have—is a workable, widely accepted set of standards for cross-vendor IR communication.

That's the goal of the Infrared Developers Association (IRDA), an 80-vendor coalition, which has promulgated the first in what is likely to be a series of compatible infrared standards. The first stan-

dard, used in most of the IR links we'll see this winter and spring, is limited to the maximum data throughput of a well-designed, well-implemented PC serial connection: 115 kilobits per second. Even if you're the 100-megabit-per-second Ethernet type, don't sneer at 115 Kbps. It's still very practical for its intended uses, and it turns out to be a lot faster than it sounds. For example, at the IRDA's top speed, a 10K word-processing file would transfer in a flash.

LITTLE RED WINDOWS

IBM, Digital, Sharp, and (of course) HP have already announced IR-equipped notebooks; this year we'll see little red IR transceiver windows on a wide variety of notebooks and PDAs—and some desktop PCs—from many other vendors. Add-on IR links for desktops will be widely available and relatively cheap by springtime.

Being inexpensive, in fact, is one of IR's great virtues. Its other virtues are being compact, accurate, and not too power-hungry. At present, it costs less than 5 dollars to put an IR connection into a PC, and by mid-1995, most notebook vendors are likely to see the decision to add IR capability as a no-brainer.

What'll we use 115-Kbps infrared links for? Most obviously, for transferring files from notebook to desktop and vice versa, using utilities such as LapLink for Windows (which already has a wireless option built in). I suspect we'll also see IR added to HP LaserJet printers soon, for walk-up "convenience printing." Canon says it's going to put IR links into its laser printers and fax machines.

Also look for a small explosion in IR-linked devices for business travelers. How sweet it would be to make an IR modem link to an airport or airline travel



By midyear, most notebook vendors will see adding IR capability as a given.

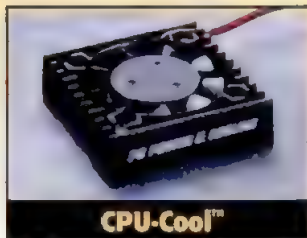
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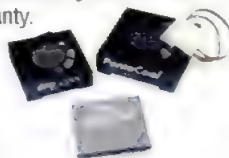


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Jim Seymour

club pay phone, without our little "defeat the phone system" toolkits. Imagine getting to your hotel room, sitting down at the little desk next to the bed, pulling out your notebook and actually making a no-pain, no-crawling-around connection to check waiting voice and data e-mail, send outgoing e-mail and faxes you wrote on the plane, and grab an updated version of the new price list you need for tomorrow's meetings.

Look for networked ATM machines to add IR connections, too, in the somewhat more distant future.

FASTER IR ON THE WAY

A workable standard is the key enabler here, and the IRDA 115-Kbps spec is going to fill that role. Beyond these first implementations, faster IR links will begin to let us connect to existing LANs with acceptable if still not blazing speed. IBM's new ThinkPads have IR, and out of the box they run ten times as fast as the IRDA spec between compliant units. Indeed, IBM is lobbying to make its 1.2-Mbps IR spec the next IRDA standard. And HP is showing prototype notebooks with IR links three times as fast as IBM's.

But don't think you have to wait to get a useful, long-lived product: These first 115-Kbps-standard machines are very useful. By exploiting two other important IR characteristics—very short range and relatively narrow acceptance angles for the IR emitters and receptors—they allow many users to work simultaneously in an office without interference.

This year's other big boost for infrared data links will come with the advent of Windows 95, which includes IR drivers. With an IR transfer as just another easy-to-choose printing option on Win 95-based PCs—just as fax connections appear to the Windows user today as nothing more than a simple printer-driver selection—IR "printing" to another PC or to any of a wide variety of IR-attached peripherals is going to take off.

I've been a big fan of spread-spectrum radio as a very-short-range file-transfer tool. LapLink's AirShare system has gotten me out of a lot of jams, and no doubt I'll continue using it. But the economics and performance of IR, soon joined by nearly universal availability, are likely to turn most of us away from radio waves to light beams for most of the local data we transfer into and out of our PCs.

Beam me up, IRDA. □

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Bill Howard

Comdex: What Really Mattered

Spin control and product positioning have taken on as much importance as actual product announcements at Fall Comdex, the computer industry's annual gathering of the clan in Las Vegas. Image and reality are presented in equal doses to the

190,000 (announced) attendees. Here's my take on what to make of half a dozen show trends and announcements.

- **Native Signal Processing (NSP).** You can process audio and video through your \$500 Intel Pentium CPU and eliminate the expense and complexity of adding a \$25 (nonIntel) digital signal processor (DSP). That's the company line from Intel and the subject of CEO Andrew Grove's Comdex keynote speech. Part of this attitude makes sense: Multimedia will take off only when the majority of PCs can process sound and video, and using the CPU is the shortcut to 100 percent penetration. But mainly, Intel is dreaming up more ways to load the CPU so you'll want a faster Pentium or P6. There's still a lot of life left in the DSP market.

- **P6 (P-Sixtium? Hextium?).** While there were no formal announcements, Intel now appears ready to sample its Pentium successor, the P6, in the first half of 1995; systems should be available by the second half. Meanwhile, the Pentium will get 120-MHz and 150-MHz iterations in 1995, thus keeping Intel a step ahead of the competition.

- **CD—recordable.** Your next CD-ROM drive will be able to create (write) CDs. What cost \$100,000 a few years back will be available for around \$1,500 from Creative Labs, Philips, Sony, and others. Blank disks will cost \$10 to \$15. Initially, recordable CD-ROM drives will be acquired for archiving and locally accessing corporate data. But they'll be adopted quickly for local backup because you can do multiple backups until you've filled all 660 megabytes. And they'll be in constant demand after hours to make personally mixed audio CDs.

- **Notebooks from HP and Digital.** Two vendors came from nowhere to challenge IBM and Toshiba for notebook leadership. After dithering around for two years

with underpowered, nonbacklit subnotebooks, Hewlett-Packard hit a home run with its subnotebook Omnibook 600. Right now Hewlett-Packard can do no wrong; no wonder its booth was crowded. Equally impressive was Digital's first Digital-engineered notebook, the HiNote Ultra subnotebook, with an ingenious bottom-mounting floppy disk drive—especially unnerving to market leader Compaq, whose line has become unexciting.

- **Power PC.** If you wanted a respite from the throngs of Comdex, the Power PC pavilion provided it, which was unfortunate: Apple, IBM, and Motorola—ostensibly partners—each have a different spin, making the consortium sound fragmented and fragile. And that's about what it is.

- **LCD panels.** Sharp unwrapped a prototype 21-inch-diagonal color LCD panel and other vendors showed SVGA and 1,024-by-768 LCD panels of 11 to 15 inches, which suggests that by decade's end LCDs will start replacing CRTs on the desktop. More immediately, the laptop panel of choice by mid-1995 will be a 10.4-inch SVGA color LCD; by year's end, the choice will be an 11.5-inch 1,024-by-768 LCD.

- **Comdex.** This may have been the year the show went beyond critical mass and approached meltdown. A bruising

page 1 *Wall Street Journal* profile of Comdex operator Sheldon Adelson on opening day fanned the flames of discontent. Intel's Andy Grove, Microsoft's Bill Gates, and Novell's Bob Frankenberg threatened to cancel their keynote presentations when the Interface Group, which runs Comdex, tried to charge \$25 a head for the traditionally free (half vision, half product pitch) presentations. And while Las Vegas has the most convention-floor space of any city in the western hemisphere, its infrastructure can't support 200,000 visitors. □



Product positioning and company-image selling were stars at this year's Fall Comdex.

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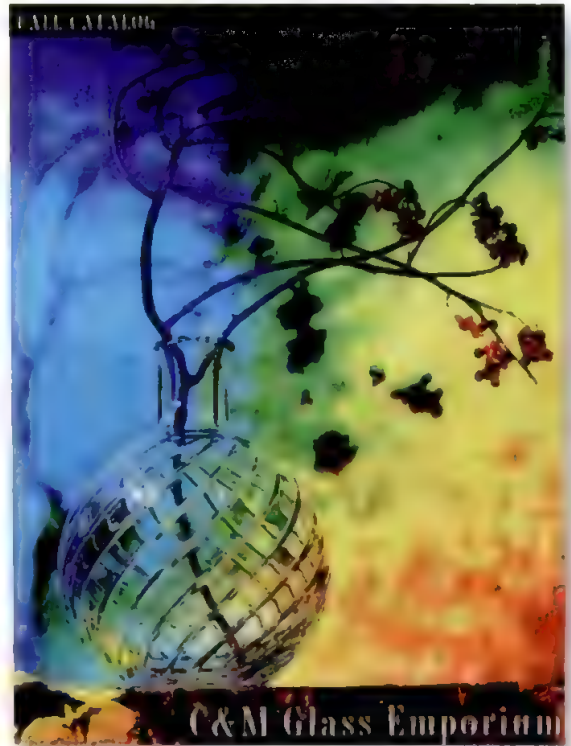


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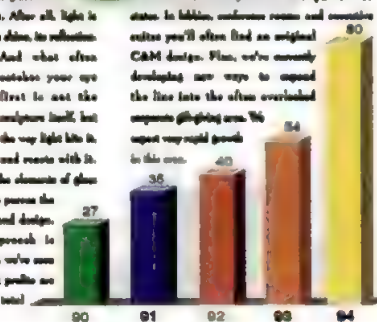
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ELECTRONIC PUBLISHING

Publish Without

New technologies are changing the way we package, deliver, and interact with electronic information.

By Lori Grunin

Today's electronic publishing tools are more like a primordial soup than a well-defined product category. We even refer to most of the categories by their underlying technologies rather than by their functions: Standard Generalized Markup Language (SGML), Hypertext Markup Language (HTML), portable document software, and hypertext publishing.

This mass of algorithmic amino acids has a single goal: to create publications that can be viewed, navigated, annotated, and distributed via CD-ROM, over a network, or through an on-line service. Much like groupware, these building blocks have overlapping capabilities, and vendors combine them in various ways trying to hit on a formula that results in a viable set of tools.

THE SAME BUT DIFFERENT

Despite their common goal, product types differ because they attempt to address different niches in the electronic publishing market. The newest, most electronically oriented of the group is HTML (see "HTML: Nothing but Net"), the



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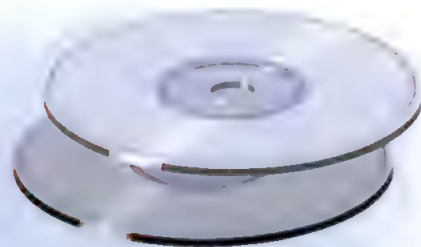
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current technology of choice for publishing on the Internet. As a tagged ASCII format, HTML compresses well, supports hypertext links, and is easy to write viewers for (as evidenced by its widespread support in Web browsers such as Mosaic). Our feature on Web browsers, "The Web Untangled," includes reviews on several Web browsers available today.

Like many on-line technologies, however, HTML pays little attention to formatting, a flaw attributable as much to our primitive networks as to the immaturity of the software. That's fine for electronically *distributing* information, but it's not really *publishing* as we tend to think of it. In a sense, using HTML is like designing a newsletter using a single-column format, Times Roman and Arial typefaces, and an occasional low-resolution image. Nor are there any robust tools for translating print content into HTML-structured documents.

HTML has great genes, though; it's a specific instance—a document type definition (DTD)—of SGML. SGML is a complex set of rules for describing the structure and managing the content of any digital document. While SGML is potentially the most powerful publishing technology around, it's also the least understood, least appreciated, and least sexy (see "SGML and HTML: Tag Masters"). Because it is more of a rule-based, object-oriented way of handling text and graphics, it gets incredibly complex. Vendors have spawned a host of narrowly targeted products such as editors, viewers, and converters in attempts to make SGML comprehensible and accessible to more than a select few. You could say that prettily interfaced HTML editors exist simply to keep potential Internet publishers from running away in terror.

Aside from being an architecture that can eventually support media objects such as audio or video, SGML's long-term attractions for electronic publishers are its nonrestrictive links with print publishing and its ability to handle exceptionally long documents (more than 1,000 pages) efficiently.

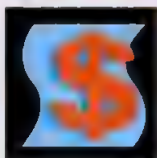
While SGML has been around awhile, it's a relative newcomer to electronic publishing. By contrast, authoring programs with hypertext capabilities



What is it?



What is it used for?



How much do the document creation tools cost?



What are the document viewing costs?



How difficult is it to implement?



What other tools will you need?



What products are part of this category?

What does it look like?

Portable Documents

Portable documents maintain the visual integrity of a document regardless of what platform the document is viewed on, or whether the system has the document's originator application, fonts, or graphics. The portable document is usually rendered uneditable.

This is a great tool for delivering documents to readers who may or may not have the tool normally needed to read the original document-file format. It is used for on-line help and Internet documents and found in on-line help and infobases.

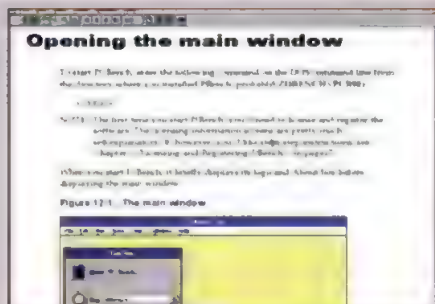
From \$99 to \$195.

Usually free.

Since most portable documents work like Windows printer drivers (you select the print option and the document is "captured" in the product's own viewable format), implementation is usually a no-brainer.

All documents are edited and formatted in a host application before being processed through portable document software.

Adobe Acrobat, Common Ground for Windows, Replica for Windows, WordPerfect Envoy.



Hypertext Publishing

These are tools that collect and structure free-form information from multiple files for the creation of master documents. The end product includes numerous reference points that let you link to different locations within the files.

Hypertext publishing tools are used for creating links to related subjects, so readers can effortlessly drill down through chapters, sections, and associated documents. They are used for long or multiple documents.

From \$299 to \$895.

Anywhere from free to \$79 per runtime module.

Implementation is not too tough if the product is capable of interpreting your native word processor's styles.

The raw materials are text and graphics files from other applications.

Folio Views for Windows, GUIDE Author, HyperWriter for Windows, Lotus SmartText, Oracle Book.

SGML

SGML, the product of more than ten years' work by a worldwide standards committee, is a set of rules for describing the structure and managing the content of any digital document.

SGML is used to create complex documents that can be shared across a corporation or industry. The document can remain intelligently linked to source information for instantaneous updates. The typical application is a technical or equipment manual.

Varies from \$995 per license to \$5,000.

Costs can run into thousands of dollars to create a custom viewing application that reads your document type definition.

SGML is not for the faint-hearted. It requires a major commitment of time and resources.

You'll need to purchase a viewing system and hire a VAR to customize it. You'll also need a full-time SGML technician.

Adept•Editor, Author/Editor, XSoft InContext, DynaTag, DynaText, FastAG, Near and Far, SGML Author for Word, TagWrite, WordPerfect Intellitag SGML Edition.

HTML

A not-so-distant cousin of SGML, HTML is composed of a set of 37 tags used to describe the design of a document and its connection to other documents on the Internet's World-Wide Web.

HTML is often used to format and program Internet home pages.

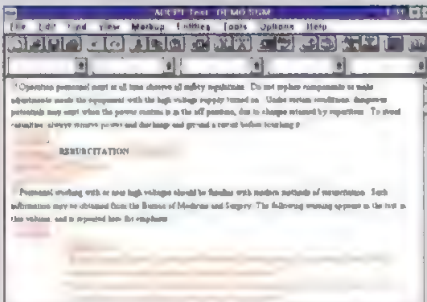
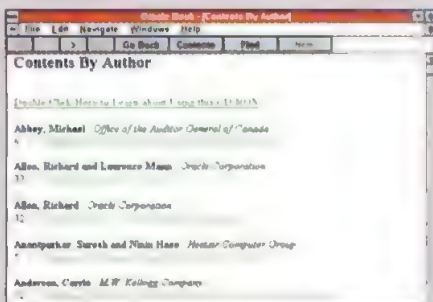
Up to \$195.

The cost of a telephone call (which includes the cost of getting on the Internet and the connect time).

HTML is far simpler than SGML but less extensible. In order to test your document's tags, you must put it on the Internet (briefly) and understand how to ride the info highway. Experience is a plus.

You'll need an Internet account, and someone to manage the home page. You'll also need an interest in teaching yourself how to use HTML, because the products offer little if any guidance.

Cyberleaf, HoTMetaL Pro, HTML Assistant Pro, HoTMetaL (freeware), HTML Assistant (freeware), Internet Assistant for Microsoft Word, SGML Tag Wizard.



How To ECONOMIZE (CALL COMPAQ D



Compaq Contura® Aero™

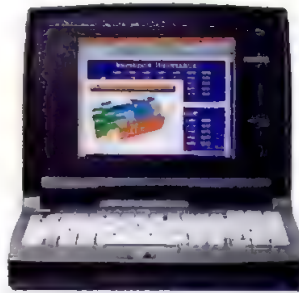
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170MB Hard Drive
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3.5" External Diskette Drive
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8" Monochrome Backlit VGA Display
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PCMCIA Type II slot
♦
NiMH Battery & AC Adapter
♦
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MS-Windows™ 3.1, and TabWorks®



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♦
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270MB Hard Drive
♦
3.5" 1.44MB Diskette Drive
♦
Local Bus Graphics
♦
1MB Video Memory
♦
Compaq SVGA Color Monitor
(1024 x 768)
♦
Energy Star Compliant
♦
Preinstalled MS-DOS 6,
MS-Windows 3.1, and TabWorks

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Hypertext Publishing Tools:

• Folio Views Infobase Production Kit

SGML Suites:

• Not Ready for Prime Time

The tangle of emerging technologies that make up the category of electronic publishing is evolving nicely. With two of four portable document packages about to upgrade, the category is poised for real im-

provement. The target that those upcoming programs must aim for is Adobe Acrobat, which—in Version 2.0—is the best overall solution today.

Hypertext publishing tools are a more mature technology. The concept of hypertext, first popularized on the Macintosh with HyperCard, is nothing new. It has, though, been expanded into an environment for the creation and delivery of intelligent documents or “infobases” that can be searched and navigated. In our review group, no product better exemplifies the way such a tool should work than our Editors’ Choice, Folio Views Info-

base Production Kit. In addition to recognizing and converting every file format that we threw at it, Folio Views makes the creation of a hypertext document remarkably intuitive. Furthermore, it features one of the fastest text search routines we saw, as well as powerful password and security functions to protect documents and allow your readers access to the infobases you create.

Folio Views is not, however, the prettiest product you’ll ever use. We found a more intuitive interface under Lotus SmartText. Unfortunately, SmartText’s nifty features are overshadowed

have long been the quiet workhorses in this arena. They also cover a broader range of capabilities. Some products, such as Folio Views and Lotus SmartText, let you index and build hypertext links for existing documents, and use basic viewer technologies to preserve the original format to some extent during display. In essence, these serve as distributable text databases but provide more “publishing-aware” tools than basic text database products such as askSAM Systems’ askSAM.

Other products, such as Interleaf’s WorldView (800-955-5323), perform the same tasks but also preserve print-formatting attributes. In exchange, however, you’re tied to Interleaf for your publishing platform—a platform more expensive, complex, and powerful than many publishers require.

At the other end of the spec-

trum you find print-centric portable document software (see “Carbon Copies”). Such programs—the most evolved of which are Adobe Acrobat and Novell’s WordPerfect Envoy—turn documents intended for print into a distributable format while preserving the printed “look.”

On one hand, this lets you leverage existing publications with minimal fuss (in most cases). But while fonts and graphics look right, the pages are often too large for the screen, and you have to scroll around and zoom in and out to view them. You can, of course, design your documents with screen-based aspect ratios.

THE NEXT GENERATION

These technologies justifiably may seem to serve separate markets; the distinctions, however, ultimately turn out to be artificial. Many products exist

by the inability to edit any text once it’s inside the product.

We refer to the SGML products we reviewed as suites despite the fact that SGML does not include FOSI support: You still have to go out and buy a separate composition application to obtain formatted, viewable, and printed output. It’s for this and other reasons—including the complexity, modular structure, and somewhat arcane nature of SGML suites—that we do not give an Editors’ Choice to any of our three reviewed products.

On the other hand, in “SGML: It’s Still à la Carte,” which covers products that represent a portion of the SGML equation, we find several packages that offer noteworthy features that any one of our reviewed products would do well to emulate. Microstar’s Near and Far, for example, makes the complicated task of DTD creation almost tenable. And a number of the conversion tools, including Microsoft’s SGML Author for Word and EBT’s DynaText and DynaTag, will certainly be among those in the front lines of the campaign to bring SGML into the mainstream.

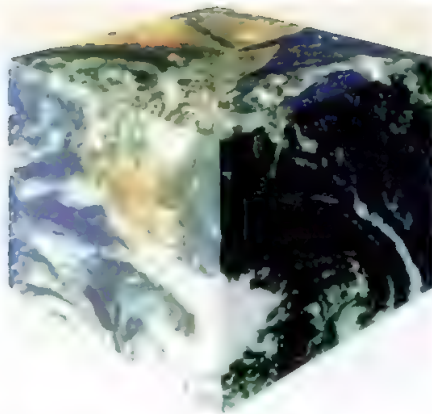
mainly to make up for omissions in the operating system—in ways such as portable document software’s addressing font display and file-format compatibility problems. Other products, such as HTML editors, address easily rectified weaknesses in existing tools. Furthermore, a number of companies, including both Microsoft and Novell/WordPerfect, soon will be providing products with SGML support.

In a perfect world, you’d have a single, layout-independent mass of content—text, sound, video, and graphics—and some sort of composition engine that could publish the content in a variety of forms. Intelligent templates would handle the layout reformatting to accommodate different output technologies and bandwidth constraints. Interleaf’s forthcoming Cyberleaf, for example, will supplement the company’s print and electronic publishing product line with an on-line-targeted authoring tool.

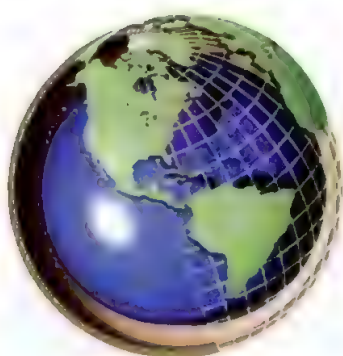
In fact, as on-line delivery technology



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Conceptual design by Robert P. Humeniuk and Jerry D. Flynn of McDonnell Douglas Space Systems

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CIRCLE 048 ON READER SERVICE CARD

improves, the authoring differences between CD-ROM-based publications and ether-based publications should become negligible. As this happens, the capabilities now found in multimedia authoring tools (for more information, see "Creating Multimedia To Die For," February 22, 1994) will also become an important factor for electronic publishers to consider.

Many of these trends are already in progress. For example, given the synergy between print and electronic publishing, it seems a waste of energy to maintain two parallel standards for HTML and SGML editors. There is, for instance, an upgrade path from SoftQuad's HoTMetaL Pro (an HTML editor) to the company's Author/Editor (an SGML authoring package).

Similarly, since hypertextual linking and full-text indexing are already important components of any electronic publishing system, hypertext authoring as a category should be absorbed into the body of electronic publishing products rather than standing alone. In fact, those hypertext packages that act most like text databases resemble document management systems with linking capabilities added.

Electronic publishing bears more than a passing resemblance to groupware in another way: For all but the smallest publishers, electronic publishing requires a strategic commitment to a set of tools. With product categories in flux, such a commitment means more than just picking out the most capable product. As you read through the following pages, be sure to remember that a product's underlying architecture must be able to carry you into the future, and that a vendor's electronic publishing tools must integrate well with the tools you already use.

Our Contributors: SEAN GONZALEZ, JAMES KARNEY, and PAULINE ORES are frequent contributors to *PC Magazine*. LORI GRUNIN is a senior editor at *Windows Sources Magazine*. EDWARD MENDELSON and CRAIG STINSON are contributing editors for *PC Magazine*. LANCE ULANOFF was the associate editor in charge of this story, and JEFF MACE was the project leader.

PORTABLE DOCUMENTS



Carbon Copies

Portable document software lets everyone view WYSIWYG versions of your document, no matter what application or fonts you used to create it.

By Lori Grunin

If you distribute an electronic version of a beautifully formatted report, its recipients *should* be able to open it with no fuss—regardless of the operating system, application, or fonts you used when you were putting it together. But thanks to incompatible operating environments and awkward font technologies, we need portable document software to solve problems we shouldn't have.

More than simple file viewers, portable document packages take documents and publications created with any application and turn them into fully formatted versions that can't be edited but can be read by anyone with the appropriate viewer. To create a portable document, you usually just use a special print-to-file command and then make sure your recipient has the file viewer (which is typ-

ically free). WordPerfect Envoy is a new contender since our last look at this category ("Can Form Follow Content?", November 9, 1993) and Adobe Acrobat is now in Version 2.0. We also look at a pre-release version of No Hands' Common Ground 2.0 and the current version of Farallon's Replica, which will be upgraded soon.

Within the next couple of years, operating systems should resolve the portable font problem. The movement has already begun: On the Mac, for example, Ares Software Corp.'s FontChameleon plugs into the operating system. Unfortunately, while the concept—a single outline that you contort into different faces—has merit, FontChameleon invents a new paradigm that requires special fonts. FontChameleon is also available for Windows.

In contrast, Bitstream's TrueDoc technology captures font-outline information during the print-to-file cycle and automatically generates hints to recreate the typeface on the target system.

While we wait for those technologies to come to full fruition, portable document software is the easiest way to make sure that everyone who needs to see a document electronically can see it, and see it accurately.

Adobe Systems Inc.

• Adobe Acrobat

ALL REVIEWS BY LORI GRUNIN
Version 2.0 of Adobe Acrobat addresses enough of the previous version's problems to earn its quick ascent toward the de facto standard of portable document software. In addition to intelligently revamping the structure of the Acrobat product line, Adobe has addressed many of the flaws that made 1.0 lacking as a general-purpose portable-document solution.

Acrobat now comes in three versions—all various combinations of four basic modules. *Adobe Exchange* compares directly with the other products evaluated in this review; it provides tools

no longer needs to install a full version of Adobe Type Manager; it uses a runtime version that operates transparently in the background. You only need the runtime version when you're using Reader or Exchange. This remedies one of the most significant drawbacks of Version 1.0, but note that the runtime version remains installed, consuming system resources.

BETTER FONT EMBEDDING

Adobe has rectified another major weakness by adding traditional TrueType embedding. You can choose to embed all, some, or no fonts. The program substitutes Multiple Master instances (special fonts that are morphed to match the metrics of the original) for missing fonts.

During testing, the Multiple Master substitution seemed to work better than the embedding. Although it changed the look of the text in the CorelDRAW graphic we used in testing, we experienced none of the overlapping characters that showed up using an embedded font in a Word for Windows document, which we also used in testing.

The Distiller supports batch processing and drag-and-drop initiation, and can poll selected directories periodically for automatic conversion. It worked fine in general, but did stumble on one of our CorelDRAW-generated .EPS files.

FILE SIZES VARY

Thanks to the various embedding options, as well as a raft of compression choices, your file size for a given Acrobat document may vary widely. The CorelDRAW graphic with no embedded fonts came in at a very slim 36K with excellent graphic reproduction. (Although visually scalable, the graphics can't be copied to the clipboard as vector objects.)

On the other hand, a 19-page text-heavy document with embedded TrueType and Type 1 fonts turned out to be a

whopping 346K, almost twice the size of its next-smallest competitor. Bookmarks, thumbnails, hyperlinks, and notes also add bulk.

Though Catalog's Verity engine adds exceptionally powerful indexing capabilities—facilitating Boolean, proximity, and word-stemming searches—to both Acrobat and Common Ground, Acrobat's implementation isn't as seamless as it should be.

One of Acrobat's neatest features, especially for electronic publishers, is the Articles tool that lets you

define a scroll order. For example, you can set up a document so that the reader scrolls to the top of one column from the bottom of another instead of jumping to the next page.

Although creating small files requires some concessions from the document author, Acrobat provides an impressive set of tools for creating and distributing graphically sophisticated electronic documents.

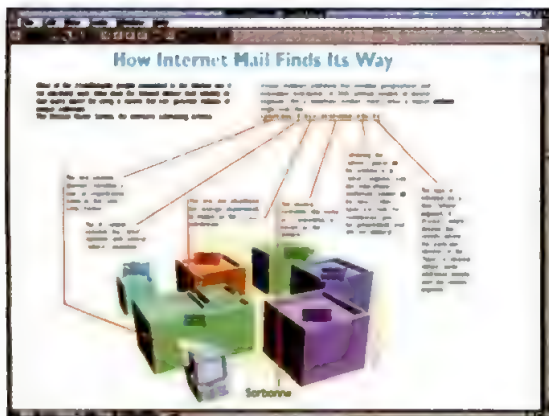
► **Adobe Acrobat, Version 2.0.** List price: \$195; *Acrobat Pro*, \$595; *Acrobat for Workgroups*, \$1,595. Requires: 386-based PC or better, 4MB RAM (*Reader and Exchange*), 8MB RAM (*Distiller and Catalog*), 5MB hard disk space, *Microsoft Windows 3.1 or later*. Adobe Systems Inc., 1585 Charleston Rd., P.O. Box 7900, Mountain View, CA 94039; 800-833-6687, 415-961-4400; fax, 415-961-3769.

Circle 475 on reader service card

No Hands Software Inc.

• Common Ground

Gunning for both Adobe Acrobat's and WordPerfect Envoy's share of the market, No Hands Software has taken a two-pronged approach with the upcoming Common Ground, Version 2.0. (At press time, the new version was expected to ship in mid-January 1995.) The company is completely replacing the font engine and rewriting Version 1.0's PostScript-support mechanism. The program contains a significantly enhanced



Acrobat did an exemplary job reproducing the test page, and was still readable and generally attractive.

to generate and build navigational structure into documents. *Adobe Distiller* provides print-to-driver PostScript support and translation into the product's .PDF file format. *Adobe Reader* is the now freely distributable .PDF file viewer. *Adobe Catalog* is the Verity indexing engine; recipients must have Exchange to take advantage of it.

When distributing .PDF files, Acrobat

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cause a family feud?**

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Family PC come
between Julia
and Trevor?**

*As the
Hard Drive
Turns*

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**Will Simone try
to make the
4DX2-66
vanish with
wrinkle cream?**



*Furs pictured are made from artificial materials.

Setting: Lawyer's Office

Characters:

Jonathan Mattison: Lawyer
Kiki: Young widow of the deceased
Anna: Evil daughter of the deceased
Richard: Anna's wimpy husband
Victor: The deceased

**Featured Gateway 2000 PC:
P5-100XL with 1GB hard
drive, quad-speed CD-ROM
and 17" Vivitron color
monitor.**

We now resume our story already in progress. Victor's family has gathered for the reading of his will. While vacationing on the island of Maltase with his lovely bride Kiki, Victor slipped on the rocks and plummeted over a cliff. His body never found, Anna, Victor's power-hungry daughter, greedily bribed Mattison to read the will.

Anna: Could we get on with it? I have a 1 o'clock appointment with my plastic surgeon and I don't intend to be late.

Mr. Mattison reads the will: "I, Victor Robinson, being of sound mind and body, do hereby bequeath my Gateway 2000® P5-100XL to a woman who is very close to me. This PC's super-powered Pentium™ processor, 16MB of RAM, quad-speed CD-ROM and whopping 1GB hard drive have served me well. I successfully kept two sets of books for the sawmill with this powerful PC. With Microsoft® PowerPoint® presentation graphics program, just one of the applications in Microsoft Office Professional, and the 17-inch Vivitron™ color monitor, I created amazing slide show presentations and lured many investors into my business schemes. Because the P5-100XL is my most prized possession, it's my request that it be given to my young and spirited wife Kiki. I know she loves to dance to the heart-pounding stereo sound from the ACS-31 speakers. Kiki, at \$4,299 the P5-100XL from Gateway 2000 is the best value in the PC industry. Please treat it well."

Anna: What?! I was supposed to get that system. Not that child! I've had my eyes on that P5-100XL since the day Daddy ordered it from Gateway 2000. It's Intel® 100MHz Pentium™ processor is the fastest processor available today that can still run the most popular software applications. It should be mine, not that little gold digger's! Richard! Don't be a spineless jellyfish! Make them give me the PC!

Mattison: Oh, wait Anna, here's something for you. "To my dear Anna, I leave my Yorkshire terrier, Fifi. Remember, it's a dog's life."

Anna: AAAUUUGGGHHHH!

Fifi: Ruff.

Join us next month for "As The Hard Drive Turns." Will Anna seek revenge against Kiki? Will Anna and Fifi be compatible?



pentium



GATEWAY2000

"You've got a friend in the business."

8 0 0 - 8 4 6 - 2 0 6 3

Setting: Collapsed Office Building

Characters:

Julia: Successful Realtor

Trevor: Sexy construction worker

Featured
Gateway 2000 PC:
The P5-75 Family PC multimedia system
with 16-bit sound card and Altec
speakers, TelePath II 14.4K fax/
modem and six exciting Microsoft
software applications.

Trevor met Julia every afternoon in her office. Since she's married to the contractor who oversees Trevor's construction crew, it's the only way they can continue their torrid affair. But now they are trapped in her collapsed office after Mt. Eruptus exploded into a volcano causing an earthquake measuring 7.1 on the Richter scale.

Julia: Oh, Trevor, what are we going to do. I can't die! I just spent thousands of dollars on fertility treatments so we can conceive our love child after my fortieth birthday party tonight!

Trevor: Let me get this tourniquet on my severely broken arm and then I will use my brute strength to save us.

Julia: Trevor, look! There's my Gateway 2000® P5-75 Family PC™ multimedia system underneath the rubble.

Trevor: Wow! I may look like your average, sexy, suntanned, hunk construction worker, but I love PCs. You know this P5-75 Family PC multimedia system is a lot like me. It has a powerful Pentium™ processor, a massive 730MB hard drive and a 15-inch Vivitron™ monitor for stunning color images. This P5-75 will give us all the PC power we'll need for years to come. And at only \$2,499, it's a great value.

Julia: Yes, and the brawn and raw vigor of this PC also reminds me of you. I can run tons of applications simultaneously. The double-speed CD-ROM, 16-bit sound card and Altec speakers give me amazing multimedia capabilities. And with the fax/modem I can order sexy little numbers from Elizabeth's Enigma for our trysts.

Trevor: That's it! We'll call the Emergency Headquarters with the modem and let them know we're here.

Julia: Oh Trevor! Do we have to? That plaster in your hair is lighting my flames of passion.

Trevor: We'll have plenty of time for love while we wait for the emergency crew. Look at this cool software. I'll use Microsoft® Works to write a letter to Mom and then I'll hit the links with MS Golf.

Julia: Trevor! What about me? This is our window of opportunity for conception!

Trevor: Just a second dear. Look at this ...

What was Julia going to do? She couldn't lose Trevor to a PC! How humiliating! Sure it's younger and faster, but does it love Trevor like she does?"

Join us next month for "As The Hard Drive Turns." Will Julia and Trevor conceive before they're rescued?
Will Trevor leave Julia for his new love — Bob?



GATEWAY 2000







Featured Gateway 2000 PC
4DX2-66 Family PC multimedia
system with a double-speed CD-ROM,
16-bit sound card and Altec
speakers, MS Works, Encarta '95,
Money, Cinematica,
Golf and Fine Artist.

Setting: A fancy living room in a
stately home.

Characters:

Dirk: A debonair businessman

Simone: An emotionally distraught woman

Simone: Oh Dirk, I can't stand it! Our 4DX2-66 Family PC™
multimedia system from Gateway 2000® is taking over our home. It
organizes the family schedule down to Jimmy's flights to Paris to see
his real mother, and Sally loses all sense of time when she uses
Microsoft® Fine Artist. Why only last week she was six and now she's sixteen. The family has
no need for me!

Dirk: That's not true Simone. Didn't I profess my love for you by purchasing another city block
of Gateville even though you're carrying my brother Rock's baby? Don't I stand by you through
your bouts of schizophrenia when you think you are your sister Cheryl? The 4DX2-66 Family PC
multimedia system is a productivity tool. We can use MS Money to track your pregnancy expenses
so Rock will have an itemized bill, and the children can use MS Encarta™ for their homework. And
most importantly we can track your daily medication with the spreadsheet and database in MS
Works. Remember last year when you got your prescriptions confused. We don't want you handing
out May baskets to the neighbors in nothing but your birthday suit again, now do we? Remember,
this family's reputation is at stake here.

Simone: Oh Dirk, you're so good to me. I should've known you're only concerned with my well-
being. The 4DX2-66 Family PC multimedia system has everything we need for multimedia including
PCI graphics, double-speed CD-ROM drive, 16-bit sound card and Altec speakers. And at \$1,899, we
have plenty of money left for that experimental wrinkle cream I want to try!

Dirk: Yes, Simone, Gateway's 4DX2-66 is a wonderful addition to our family. We get a 30-day money-
back guarantee and a three-year warranty on parts for our desktop PC and Gateway monitor. Gateway's
friendly employees will provide us with technical support for the life of our PC. On-site service is
available during the first year in most U.S. locations and may be provided without charge if their
technicians determine it's necessary. They'll even send us a free written copy of their warranty if we
request it.

Simone: Marvelous! Catch me Dirk. I love this Gateway PC so much I'm feeling faint!
*Join us next month for "As The Hard Drive Turns." Will Simone hit her head on the coffee table and
start to think that the Gateway 4DX2-66 is her long lost brother Charlie?*



GATEWAY2000

8 0 0 - 8 4 6

Gateway 2000® Family PCs™

4DX2-66 FAMILY PC

- Intel® 66MHz 486DX2 CPU*
- 8MB RAM
- 730MB 10ms IDE Hard Drive
- Local Bus Graphics with 1MB
- Double-Speed CD-ROM, 16-Bit Sound Card & Altec Speakers
- TelePath™ II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 14" Color CrystalScan® Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS® 6.22 & WFW 3.11
- MS Works, Encarta™ '95, Money, Cinemania® '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

\$1899

P5-60 FAMILY PC

- Intel 60MHz Pentium™ Processor*
- 8MB RAM, 256KB Cache
- 540MB 11ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 16-Bit Sound Card & Altec Speakers
- TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 14" Color CrystalScan Monitor
- Desktop Case
- AnyKey® Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta '95, Money, Cinemania '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

\$2099

P5-75 FAMILY PC

- Intel 75MHz Pentium Processor*
- 8MB RAM, 256KB Cache
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 16-Bit Sound Card & Altec Speakers
- TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Vivitron™ Color Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta '95, Money, Cinemania '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

\$2499

P5-90 FAMILY PC

- Intel 90MHz Pentium Processor*
- 8MB RAM, 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- Quad-Speed CD-ROM
- 16-Bit Sound Card & Altec Speakers
- TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta '95, Money, Cinemania '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

\$2899

Professional Systems

4DX2-66

- Intel 66MHz 486DX2 CPU*
- 8MB RAM
- 540MB 11ms IDE Hard Drive
- Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works 3.0 & Money
- 3-Year Limited Parts Warranty

4DX2-66 \$1599

4DX2-50 \$1299

(w/ 340MB Hard Drive & 4MB RAM)

P4D-66

- Intel 66MHz 486DX2 CPU*
- 8MB RAM, 256KB Cache
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional,** Bookshelf® & Money
- 3-Year Limited Parts Warranty

\$1899

P5-75

- Intel 75MHz Pentium Processor*
- 8MB RAM, 256KB Cache
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional,** Bookshelf & Money
- 3-Year Limited Parts Warranty

\$2299

P5-90

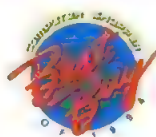
- Intel 90MHz Pentium Processor*
- 8MB RAM, 256KB Cache
- 540MB 11ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- Quad-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional,** Bookshelf and Money
- 3-Year Limited Parts Warranty

\$2499

P5-100XL

- Intel 100MHz Pentium Processor*
- 16MB RAM, 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- ATI Mach 64 with 2MB VRAM
- Quad-Speed CD-ROM
- 16-Bit Wavetable Sound Card & Altec ACS-31 Speakers w/subwoofer
- 3.5" Diskette Drive
- 17" Vivitron Color Monitor
- Tower Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional,** Bookshelf & Money
- 3-Year Limited Parts Warranty

\$4299



A hearty thanks goes out to Computer Shopper readers for our "clean sweep" of the 1994 Computer Shopper "Best Buy" system awards! We truly appreciate your support, and we'll do everything in our power to live up to the confidence you've shown in us.

***MS Office Professional 4.3 includes MS Word, Excel, PowerPoint® presentation graphics program, and Access® database.*



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Intel Verified:
Upgradable



Star-Studded Extras!

Dramatic values from Gateway 2000®. These peripherals and software, sold only with the purchase of a system.

MULTIMEDIA

Audio Multimedia Kit

Here's everything you need to add multimedia to a Gateway PC.

- Gateway 2000 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
- 2 Altec ACS-5 speakers
\$99 (with system purchase)

Wavetable Audio Multimedia Kit

Once you've heard wavetable audio, basic audio will never do!

- Ensoniq® Soundscape™ 16-bit wavetable sound card, MT-32 and FM mode compatible. Supports most software for popular sound cards and standards including General MIDI, Sound Blaster, AdLib, Roland MPU 401, MS Windows Sound Sytem and MT 32
- New Altec Lansing ACS-31 three-piece speaker system
- Blue Ribbon Sound Works' SuperJAM! jr. software
\$209 (with system purchase)
\$99 (to upgrade from systems that include the 16-bit sound card and Altec ACS-5 speakers)

Altec Lansing ACS-31 Speakers

A Gateway exclusive from Altec Lansing: a three-piece speaker set at a two-piece price. Two 3-inch free-standing speakers crank out up to five watts per channel while the subwoofer can deliver 15 watts of heart-pounding bass.

\$99 (with system purchase)
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Multimedia Software Flight Pack

Seven top-of-the-line flight CDs. Package includes TFX: Tactical Fighter Experiment, Aces Over Europe, Comanche, Strike Commander, Privateer, Wing Commander Armada and Warplanes. You also get a joystick and 20-disk storage rack. **\$99**

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Non-interlaced color monitor using Sony® Trinitron® tube technology, capable of 1280 x 1024 resolution in non-interlaced mode, .26 dot pitch.

Upgrade from a 14-inch CrystalScan® 1024NI monitor **\$360**

Upgrade from a 15-inch Vivitron™ monitor **\$260**

(Upgrade prices good only at the time of system purchase.)

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Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. Includes data and fax communication software, CoSession™ Host remote diagnostics, plus a CompuServe® trial membership. **\$99**

Colorado Memory Systems® TBU

250MB internal tape backup unit copies up to 9.5MB per minute. Comes with MS Windows™ and DOS software, one tape and cable. **\$149**

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Hewlett®-Packard 4L LaserJet Printer

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Hewlett-Packard 4P LaserJet Printer

A 600dpi printer for four times the dots of 300dpi laser printing with enhanced PCL 5 and 45 scaleable typefaces. 2MB standard memory and three universal SIMM slots available for additional memory or PostScript fonts. Includes parallel cable. **\$999**

Epson® Stylus™ Color Ink Jet Printer

A high-quality color printer at an affordable price! Features 360dpi or up to 720dpi using specially coated paper. Exclusive technology eliminates "feathering." Includes parallel cable. **\$529**

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Get advanced laser printing at a personal laser price. Features include edge-smoothing technology for incredible sharp printing of text and graphics. 22 fonts and 1MB memory. Includes parallel cables. **\$459**

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NETWORKING

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Triple Media Card **\$89**
Twisted Pair only Card **\$69**

Token Ring Adapter

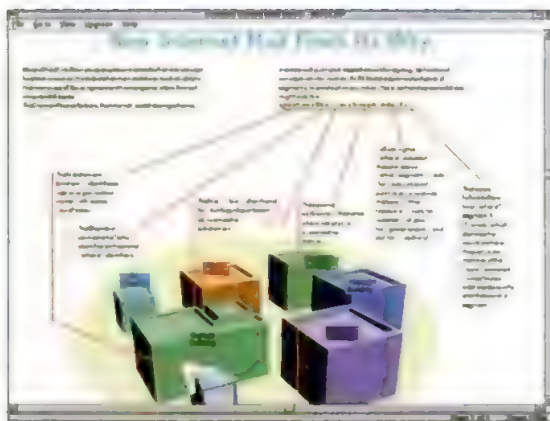
IBM® 16-bit Token Ring card **\$429**

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8 0 0 - 8 4 6 - 2 0 6 3



The TrueDoc engine in Common Ground 2.0 lost the spacing information for the text, so words ran together.

set of tools aimed at both electronic publishing and corporate internal distribution.

Version 1.0 used a font-replication technique, which has been scrapped in favor of Bitstream TrueDoc technology. In addition to being able to handle any font, which frees you from worrying about a font's ability to embed (not all TrueType fonts are easily embedded, and no Type 1 fonts are), TrueDoc is a more compact technology.

In the prerelease of Common Ground 2.0 that we looked at, the Common Ground version of our Microsoft Word for Windows chapter took about 213K. While that's almost four times the size of the WordPerfect Envoy version (which doesn't store Type 1 metrics), it's around 140K less than the Acrobat version (which does). Font reproduction looked very good in the Word document.

Like Acrobat, Common Ground 2.0 will offer an API for third-party developers to create plug-in modules, and as in Acrobat, the first plug-in is Verity's full-blown search engine. The implementations differ slightly, however: Common Ground proves more seamlessly integrated into the engine, and shows you the context of each search hit within a document rather than just a list of the documents with hits. A Common Ground SDK also provides viewing technology in DLL and C++ libraries for integration into applications such as Lotus Notes. Common Ground 2.0 will support e-mail distribution via VIM, MAPI, and Notes.

Other electronic publishing-oriented

features include a table of contents, hyperlinks, highlights, and the ability to attach notes to pages. Common Ground has two viewer options that are easily embedded: the limited MiniViewer, which adds 150K to the file size, or the ProViewer, which supports navigation and search and adds 500K to the file size.

Common Ground 2.0 will certainly be an improvement over the previous version; whether or not it surpasses Acrobat and WordPerfect Envoy remains to be seen when the

product ships.

► **Common Ground, Version 2.0.** List price: \$189.95; upgrade, \$49.95. Requires: 386-based PC or better, 2MB RAM (4MB RAM recommended), 4MB hard disk space, Microsoft Windows 3.1 or later. No Hands Software Inc., 1301 Shoreway Rd., #220, Belmont, CA 94002; 800-598-3821, 415-802-5800; fax, 415-593-6868.

Circle 476 on reader service card

Farallon Computing Inc.

• Replica

Although Farallon's \$99 Replica, Version 1.0.1, is the least ambitious of the four portable document solutions evaluated in this roundup, it's also the least demanding of resources (it will even run on a 286), least confusing, and least invasive.

The most important change in the 1.0.1 release is that text in Type 1 fonts now remains text (although Type 1 fonts still are reproduced using bitmaps). The new version also claims improved output to Hewlett-Packard printers in PCL mode, although a test printout on a LaserJet IIISi reflected the same artifacts we saw in the screen display. Farallon says that Replica now also installs under Win-OS/2, and that it has fixed bugs in custom-page orientations and sizes and in the printing of characters in small caps.

When you generate a Replica file, you get various embedding options for TrueType fonts. You can forgo font em-

bedding altogether; you can embed them all; or you can use screen-font embedding (unique to Replica) that supplies you with low-resolution bitmap fonts. This option is intended for documents you don't expect recipients to print. Optimal embedding provides you with additional, 300dpi printer fonts. In our CorelDRAW test graphic, this translated to a 17K file for screen-font embedding versus 36K with optimal embedding.

SECURING DOCUMENTS

Besides creating and viewing portable documents, you can set security to disallow printing, to password protect documents, and to control the copying of text (either as it flows or in columns) and graphics (using rectangular or irregularly shaped selections) to the clipboard. Vector graphics remain vector-based.

The most perplexing problem we encountered with Replica was its periodic tendency to create individual files for each page of our Word for Windows test document for no apparent reason. This made it impossible to print the entire 300-page publication. A 19-page test chapter using optimal font embedding, however, took about 139K; it took 420K with the viewer embedded. (The program installs the viewer, which is free in the current version, to the recipient's hard disk upon launching.)

Replica covers the basics and offers a few nice touches, making it suitable for distributing short, simple documents. But if you need real electronic publishing tools or support for complex graphics, you'll need a more robust solution.

► **Replica, Version 1.0.1.** List price: \$99.



Replica 1.0.1's handling of fonts was good but the graphic suffered from some breakup in the bitmap rendering.

Requires: 4MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or later. Farallon Computing Inc., 2470 Mariner Square Loop, Alameda, CA 94501; 510-814-5100; fax, 510-814-5020.

Circle 477 on reader service card

WordPerfect, The Novell Applications Group

• WordPerfect Envoy

WordPerfect Envoy 1.0a inhabits the middle ground of this small product category. It's more powerful than Replica, but lacks some of the sophisticated tools available in Adobe Acrobat. With Version 1.0a, WordPerfect has updated the interface slightly to more closely resemble the rest of the products in the Perfect Office family.

To generate Envoy files, you can use the traditional print-to-driver approach or "import" the file; importing launches the source application and automatically runs the print-to-driver sequence. Once the file is created, Envoy operates much the same as Acrobat and Common Ground. You can highlight text, create hyperlinks, add notes, or generate bookmarks. You can view bookmarks by pulling up the list from the View/Go to Bookmark menu. Envoy doesn't allow you to link across documents with its hyperlink tool, either, but it does generate thumbnails automatically like Common Ground.

Envoy embeds TrueType fonts and substitutes for Type 1; fidelity was excellent for the former and acceptable for the latter on our Word for Windows test document and CorelDRAW test graphic. You have a choice of no fonts (in which case the program saves the metric information font substitution), embedding selected fonts, or embedding all non-standard fonts. The program also offers a variety of bitmap compression options, and it lets you specify the resolution of bitmaps—say, 96 dpi for display-only files. Envoy lets you choose to save bitmaps in depths of 4, 8, or 16 bits. But you're probably better off doing your color reduction in an image-editing package because Envoy doesn't dither color images.

MINI-VIEWER ATTACHED

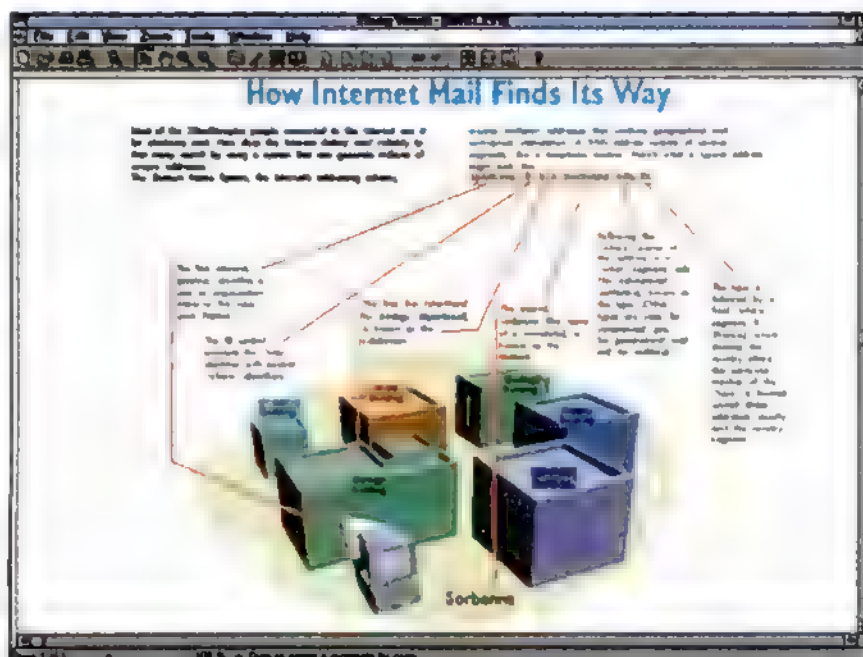
For distribution, you can embed a mini-viewer with a file which adds almost 500K to the size; the .EVY version of our CorelDRAW graphic took about 94K, while the .EXE ran 587K. The mini-viewer also has a significant drawback: It doesn't support font embedding, so display can be erratic. For CD-ROM publishing, Envoy includes a full version of the product, but it is locked in such a way that it can open only specific Envoy files.

Currently, Envoy lacks a solution for handling PostScript, but WordPerfect plans to ship a filter that takes .PDF files generated by Acrobat Distiller and converts them to the .EVY format. The filter works similarly to Distiller in that it allows batch processing.

Depending on the variety and types of fonts you use, Envoy files can be smaller than Acrobat's. Our 300-page Word for Windows test document, with its mix of TrueType and Type 1 fonts, turned out to be 766K as an Envoy file versus 1.2MB as an Acrobat file using embedded fonts. And it's just as important to note that Envoy and Acrobat were the only two of the four programs that could successfully handle the 300-page document.

► **WordPerfect Envoy for Windows, Version 1.0a.** List price: \$189. Requires: 386-based PC or better, 500K RAM, 1MB hard disk space, Microsoft Windows 3.1 or later. WordPerfect, The Novell Applications Group, 1555 N. Technology Way, Orem, UT 84057; 800-451-5151; 801-225-5000; fax, 801-228-5077.

Circle 478 on reader service card



WordPerfect Envoy handled the test page very well except for some banding in the blend behind the computer. Our Envoy test document was smaller than Acrobat's.

VB Power



ISBN: 1-56276-073-4
Price: \$34.95

This innovative guide by Dan Appleman turns Visual Basic programmers into power users by illuminating the tools of the Windows Application Program Interface (API). Includes a time-saving disk that contains source code from the examples in the text, plus a specially designed dynamic link library (DLL).

Available at fine bookstores, or call

1-800-688-0448 ext. 8448



HYPERTEXT PUBLISHING



Edit Trail

It's getting easier to create multilayered, hyper-linked electronic documents.

By Pauline Ores

Remember spending hours flipping through manuals for critical information? Those days are at an end. The innumerable electronic publishing solutions on the market today provide the ultimate in convenience: They let you move quickly, in a nonlinear fashion, from one part of a document to another. You can find the premier implementation of this capability—known as *hyperlinking*—in hypertext authoring packages. Since there are so many types of electronic publishing solutions, and many of these have hyperlink features, it's important to figure out where hypertext authoring packages fit into the big picture.

Hypertext authoring packages let you structure free-form information, and lots of it, from many different files, and in the process you can create, maintain, and update any number of links. The links can

lead to definitions, related graphics, peripheral text—you name it. The best hypertext packages should let you work with the typical word processor formats found in corporate environments while providing automated linking and searching capabilities, as well as intelligent reader interfaces.

The best part of authoring a hypertext document is that you don't have to be a programmer. On the other hand, creating any highly linked document is time-consuming. It's very difficult to modify links: To keep a document working or bug-free while making revisions, you need the advanced linking tools hypertext authoring software offers.

EXTENDING YOUR REACH

In this evaluation, we review Folio Corp.'s Folio Views 3.1 Infobase Production Kit for Windows; InfoAccess's GUIDE Author, Version 3.1; Ntergaid's HyperWriter for Windows, Version 4.01; Lotus Devel-

opment Corp.'s Lotus SmartText, Release 3; and Oracle Corp.'s Oracle Book, Version 2.0. Ranging from \$299—with the additional purchase of viewer(s)—to \$899, these packages offer solutions that are both affordable and extensible. To be included in our evaluation, a product had to offer a run-time version or reader that could either be freely distributed or licensed for a variety of platforms.

We also limited our reviewed packages to Windows-based products that are specifically designed to work with typical word processing documents. Therefore, we had to leave out packages that only work with SGML-encoded text. One such package, Electronic Book Technologies' DynaText, is discussed in the sidebar "SGML: It's Still à la Carte". Some hypertext authoring products, such as InfoAccess's GUIDE Professional Publisher (a professional version of GUIDE Author), can take advantage of SGML-encoded text, but that's not a requirement; it's simply an enhancement.

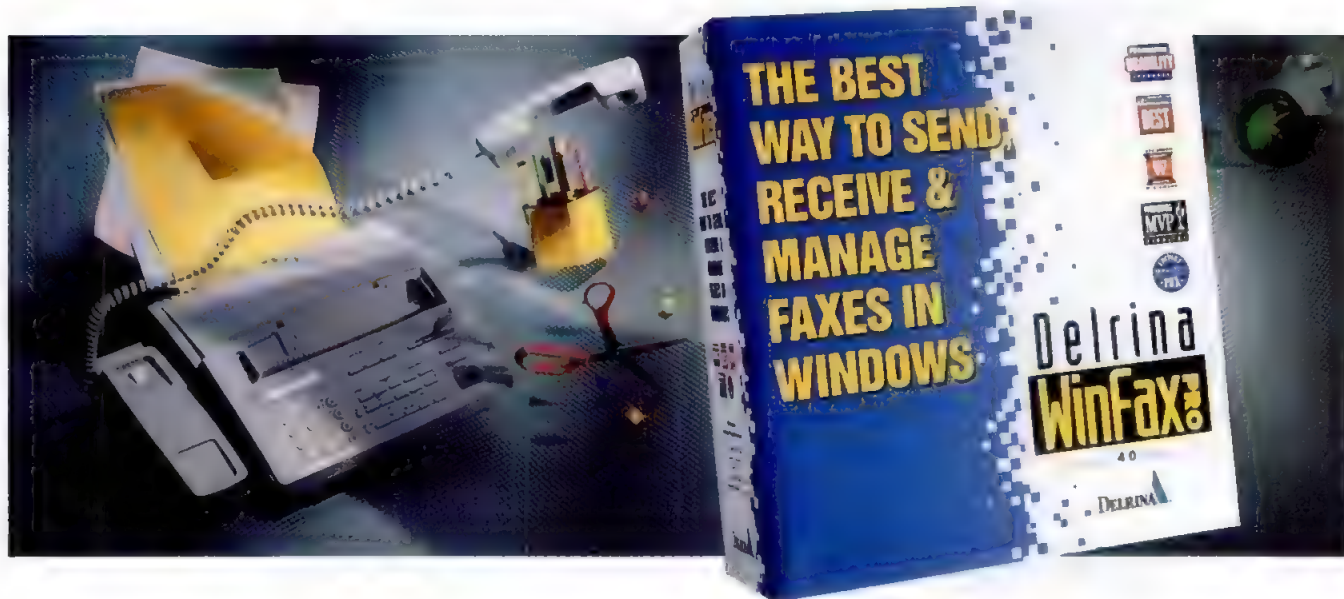
THE HYPER READER

On the surface, hypertext authoring software seems to offer many of the same features found in other types of solutions. Like most electronic publishing solutions, hypertext usually consists of two related applications or functions, one for authoring and another for viewing or reading.

Once a document has been processed by the authoring application with all of its links in place, users (or readers) depend on the reader application to navigate a document, to know where they are, and to be able to get to where they want to go as quickly as possible. On the simplest level, most electronic publishing tools let you backtrack. Hypertext authoring application solutions let you do more than simply retrace your steps, though. You can get around by using keyword, Boolean, proximity, and full-text searches; maps; relevancy ranking; bidirectional links; and links to annotations and graphics. Also, most of these packages automatically create tables of contents and indexes.

To distribute your hypertext document, you can use a range of media, including disks, CD-ROMs, and networks. For networks, it's important to determine a package's level of network awareness. An administrator (or author) should be

Introducing Delrina WinFax PRO™ 4.0. You'll wonder how you ever faxed without it.



Meet the fastest, easiest, most convenient way ever to handle all your faxing – new Delrina WinFax PRO™ 4.0, the latest version of the best-selling fax software in the world. The only one that combines the advanced faxing features you need with astonishing new ease and usability.

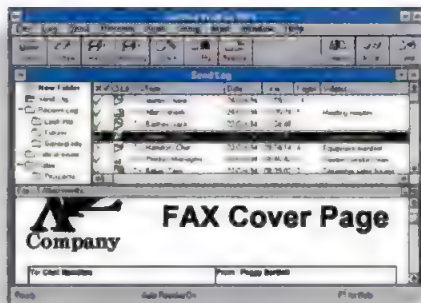
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That's what *PC/Computing* said about version 3.0. And now we've made it even better.

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Based on extensive usability testing, the new customizable interface includes folders for organizing sent and received faxes.

Don't try this with a fax machine.

Imagine faxing, not just an image of a document, but the actual file itself*, so it's ready to be used in an application. Imagine sending a single document that is automatically faxed to some people and e-mailed to others.

Now imagine you're on the road, and WinFax PRO automatically forwards faxes to you. Or lets you retrieve faxes sent to your regular fax number*. And there's more.

Get new Delrina WinFax PRO 4.0 today and put faxing where it really belongs – on your PC. Call now for information or to upgrade from WinFax PRO or WinFax LITE™. Or see your local dealer to upgrade immediately.

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1-800-268-6082



WinFax, WinFax PRO, WinFax LITE and Delrina are trademarks of Delrina (Canada) Corporation. All other product names are trademarks of their respective owners. © 1994 Delrina (Canada) Corporation. All rights reserved. *Requires Class 1 modem.

CIRCLE 250 ON READER SERVICE CARD

able to restrict a user's ability to edit and annotate any document. If a run-time is made available to users for local access, the administrator should also be able to restrict a user's right to alter the file, or parts of it. Although hypertext documents are regularly distributed on CD-ROM, distribution across a LAN or WAN does have its own particular advantages: You save time duplicating and distributing CD-ROMs, and the users get immediate access to updated information.

Some of the products reviewed here, including Folio Views, let you design the

document and associated tools, and even go so far as to let you design your own screen interface with buttons.

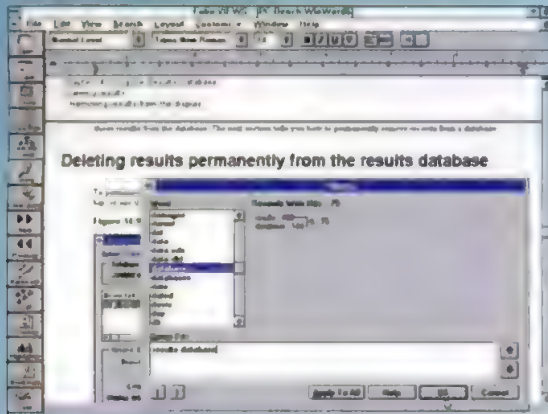
TESTING

In our hypertext authoring tests, we used each product to transform our paper-based manual, *Understanding and Using PC Bench™ 9.0*, which was created in Microsoft Word for Windows 6.0, into a standalone hypertext document. While we maintained some of the original formatting and style sheets, we also relied heavily on each package's ability to create an electronic interface suitable for

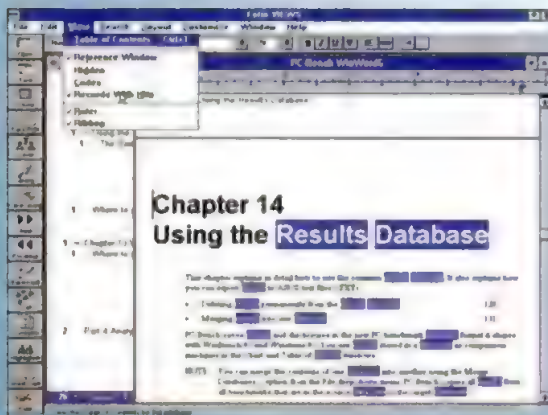
navigating within the document, linking to various sections or to external spreadsheets, and searching for text. We also used .AVI video and .WAV audio files to test each product's abilities to provide links to multimedia elements.

For products that had difficulty importing our test files, we provided a means to "back down" to an importable, though less fully formatted, file type. For example, if a package was unable to import Word 6.0 files, we provided the same file in Word 2.0 format. Most of the products had difficulty importing our primary test files; for these products we created alter-

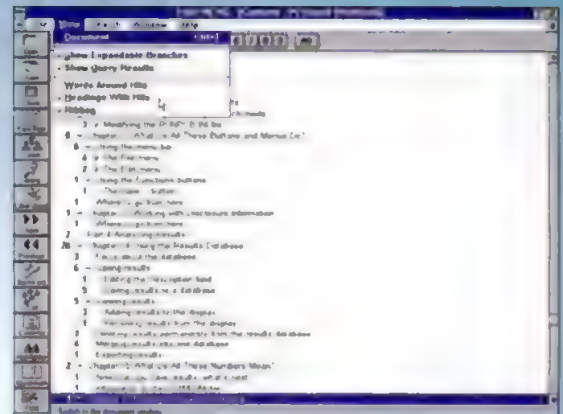
Drilling Down: Hypertext Information



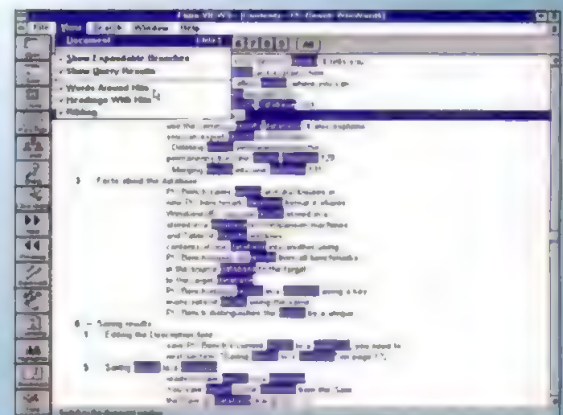
1 Your task: to understand the results database described throughout this document. You start by entering "results database" in the query dialog box. The program reports that the document contains 75 search hits.



2 Next, click on the selected heading to return to the text window. Check "Records with Hits" to hide all other text temporarily.



3 Next, switch to the contents window, check off "Headings with Hits," and notice which headings show the greatest number. Move the highlight to the heading that looks most promising.



4 In the same contents window, check off "Words Around Hits" to see some context for each hit, and move the highlight to the exact text you want to look at.

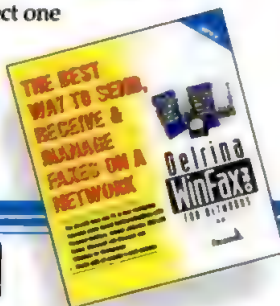


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Delrina has put the benefits of network faxing within your reach. Meet Delrina WinFax PRO for Networks™ 4.0 – the easy, affordable way to share fax modems and telephone lines across your network.

The benefits of WinFax PRO for Networks are enormous. Save the expense of buying individual fax modems and telephone lines. Make your people more productive, by letting them fax directly from their own PC. And, WinFax PRO for Networks is so easy to use and implement that you can have your entire group up and running in no time.

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native files using Microsoft Word 2.0 and designed simplified RTF with less formatting and graphics.

SERVING MANY MASTERS

In order to meet the many different project-specific corporate needs, several of the packages covered here offer more professional and advanced sibling packages. With InfoAccess's GUIDE Professional Publisher, \$40,000 gets you a week of training, a distribution license, a filter that applies to the entire document collection, and a prototype of your document. Folio Views 3.1 Professional Infobase Development Kit (\$3,995) is targeted at commercial publishers or anyone who wishes to sell information. It addresses proprietary information and royalty issues by letting you limit usage in terms of time and with passwords, and by letting you create professional setup programs that bind the viewing software to the published document.

Folio Corp.

EDITORS' CHOICE Folio Views Infobase Production Kit for Windows

EDWARD MENDELSON

Folio Views 3.1 Infobase Production Kit for Windows towers over its competitors. The "infobases" created by this hypertext authoring program convey the greatest variety of information in the most efficient ways and provide the most flexibility in exchanging updated data between a central office and multiple sites elsewhere.

Folio Corp.'s software comes in three varieties. The \$295 Infobase Manager lets end users view, annotate, edit, and update existing infobases but only allows creation of the simplest new infobases. (A similar product that reads the same infobases is available for DOS, and a Macintosh version is due soon.) The \$895 Infobase Production Kit includes the Infobase Manager and adds both simple and advanced tools for creating and modifying infobases using files imported from all standard word processor, spreadsheet, and database formats. A \$3,995 Professional Infobase Development Kit (not

tested by PC Labs) adds runtime infobases for corporate or commercial distribution on disk or CD-ROM. A separate \$1,995 Software Developers Kit lets C programmers use Folio's application program interface (API) to customize toolbars, OLE objects, or help systems, or to integrate Folio Views into complex applications.

FOLIO'S VIEW

A Folio Views infobase is basically a continuous text stream divided into records in the same file with a full-text index and a hierarchical table of contents. Records can be paragraphs, rows of data, embedded bitmap graphics or spreadsheets, or links to external objects such as video clips. Objects can be positioned anywhere in the text.

Hypertext links can be displayed as colored, underlined text as in the Windows help system, or as graphic buttons. Each outline level has its own text formatting, and the author has complete control over format and background color, using either character or paragraph styles or direct formatting of selected text. Formats can be set in both Folio Views and the original word-processor documents. The author can't lock the display to a specified width or height, so the text width changes when the window is resized. Easy customization menus let the author select icons that appear on a toolbar in the final product, but without the SDK the author can't change the program's menus or create new icons.

Infobases open by default in the text window, but it takes only two keystrokes to display text and outline windows simultaneously. An optional reference window at the top of the text window displays all the headings and subheads that identify the current position. A click on any line in the outline or reference window moves the text window to the matching position, and all moves are nearly instantaneous. For moving through an

infobase, an icon offers a backtrack feature, and a menu displays a history of the reader's moves. A "group" feature—not as intuitive as it should be—lets authors and readers combine widely scattered records into named groups that can be searched as a unit.

Security and password options let the author of an Infobase permit or prevent a variety of types of editing, linking, and annotations.

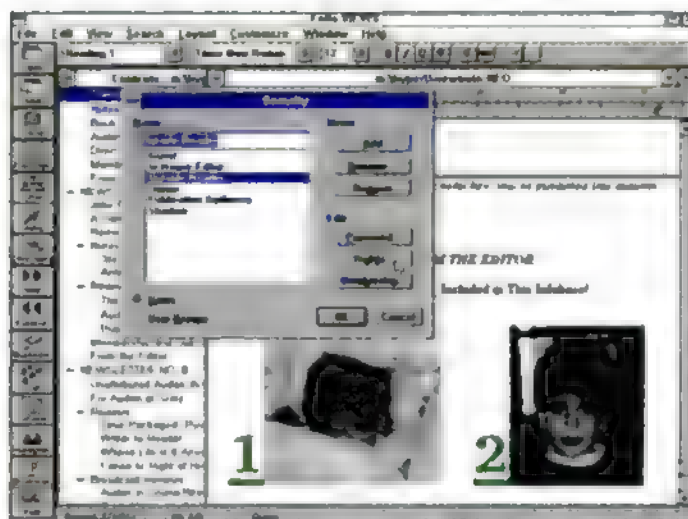
If the author permits, a reader can modify text, attach sticky notes, or (by using multiple, customizable highlighters) alter the color, size, and font of any text. A unique and powerful feature lets all changes be stored optionally in a reader's private "shadow"

file, for selective incorporation into the original infobase by the reader or author. Multiple users can read and modify the same infobase simultaneously. Changes made using a shadow file can be noted to provide a simple audit trail.

Searches are startlingly fast. They can include Boolean operators and after readers learn some mildly complex procedures, they can use the menus to limit searches to outline levels, groups, notes, highlighted text, or other subcategories of an infobase. By opening more than one infobase in the manager, readers can search multiple infobases with one command. A template editor lets authors build graphical fill-in menus for complex queries.

EASY READER

Folio Views' import filters outclassed everything else in this survey; they even allow export if you prefer to edit in your word processor. The Infobase Production Kit comes with filters for the most common formats, and the superb Microsoft Word 6.0 and WordPerfect for Windows 6.0 filters support advanced layout features such as borders. These high-speed filters convert paragraph styles into outline levels so the author can transform a well-designed word processing document into a complete infobase with a simple import command. A separate \$195 filter



Folio Views allows highly individualized settings of security privileges.

**Before you buy a color printer,
you'd better double-check your facts.**

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Do the research and you'll discover that the Professional ColorPoint 2 is twice the printer of any of its competitors. It has all the features you want standard, so you can print full-bleed, 4-color pages right out of the box. Plus, with Seiko Instruments' unique Dual Technology, it's like getting two printers for the price of one.

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SII 
Seiko Instruments

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pack supports 50 less common formats. Once the author imports the files, he can discard the originals and use the infobase manager for editing and spell-checking. A complete infobase, with index, can run half the size of the original files.

Authors and readers can export infobases to an ASCII flat-file format and manipulate links, styles, outline levels, and other features using a text editor or a DOS-based search-and-replace engine in the Infobase Production Kit.

In our testing, Folio Views was fast, flexible, and rock-solid. It imported files that made other programs crash, and made virtually every step of creating and using an Infobase simple and enjoyable. You'll need very convincing reasons for choosing anything else.

► **Folio Views 3.1 Infobase Production Kit for Windows.** List price: *Infobase Manager, \$295; Infobase Production Kit, \$895.* Requires: *386-based PC or better (486 recommended), 4MB RAM, 6.8MB hard disk space (22MB for full installation), Microsoft Windows 3.1 or later.* Folio Corp., 5072 North, 300 West, Provo UT 84604; 800-543-6546, 801-229-6700; fax, 801-229-6790.

Circle 479 on reader service card

InfoAccess Inc.

● Guide Author

BY CRAIG STINSON

Unlike the other hypertext products we evaluated, Guide Author, Version 3.1, from InfoAccess (formerly Owl International) is best suited for generating electronic documents from scratch. GUIDE authors can import ASCII text and RTF files (although not the RTF files generated in Word for Windows 6.0), as well as graphics in .BMP, .CGM, .DIB, .MSP, .PCC, .PCX, TIFF, and .WMF formats. The product offers no filters for native word processing files, and the RTF filter proved unreliable in our tests (with documents originating in Word for Windows 2.0).

Guide's \$800 price tag includes **The list items at the bottom of this GUIDE Author document window are expansion buttons.**

the authoring module and a passive run-time viewer that may be freely distributed with Guide documents. An active reader, in which users can create annotations and bookmarks, is available from InfoAccess for \$100. Another product, Guide Passport, was in prerelease testing as we went to press. Scheduled for first-quarter shipment at a price of \$4,995, Guide Passport will remedy Guide Author's principal deficiency by providing filters for many standard word processor formats, as well as an updated RTF filter.

GUIDEPOSTS

To create a Guide document, the author types, copies, or imports text into what looks like a conventional Windows word processor. Adding hypertext functionality is a matter of creating buttons, with the help of a tool bar and a Make menu. What Guide calls a button may be either a graphics element or an ordinary-looking piece of text. Four types of buttons—expansion, reference, note, and command—are available.

Expansion buttons are headings (typically, but not necessarily, text) that may be opened to reveal details. The items of a bullet list, for example, might be good candidates for expansion buttons. A reader who wants to know more about a list item can click the item to read additional text or study an associated graphic image. A second click on the expanded material returns it to its collapsed state. One way for you to create a more browsable Guide document is simply to present the reader with a top-level set of headings, in effect presenting an outline view of your document. Expansion text may itself include expansion buttons (as well as any of the other three button types), which allows for a hierarchical structure of any com-

plexity. A backtrack menu command lets the reader retrace a step at a time.

Reference buttons let the author cross-reference text to provide links to material in the same or another document. Note buttons, when clicked, display pop-up win-

dows suitable for definitions.

Command buttons are repositories for scripts created in LOGiiX, Guide's Pascal-type programming language. Like a spreadsheet's macro language, LOGiiX affords the skilled user complete control over everything that occurs as the reader works with the hypertext document. You can use command buttons to, say, set up a navigational control panel, launch other applications, or create conditional linkages in which a target branch point is dependent on different factors. Such factors might include the reader's identity, the path by which the reader has arrived at the command button, and the length of time the reader has spent with the document.

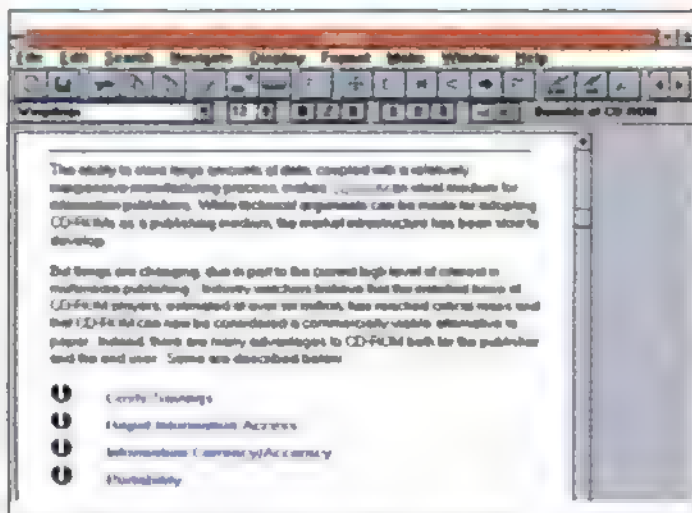
In addition to buttons, Guide provides for navigation by frame. Authors can break up documents into as many frames as are desired, and readers simply can move from one frame to the next by means of menu commands or keyboard shortcuts. A search facility is also available but, unlike other hypertext programs, Guide does not generate indexes or tables of contents.

Because Guide's philosophy appears to be one that leaves as many appearance details as possible to the author's discretion, the program doesn't automatically assign contrasting styles to text that has been made into buttons. Such a detail is up to the author. As the reader passes the mouse over a button, Guide alters the pointer shape. Distinct shapes, which authors may change, identify each button type and distinguish expansion text from expansion buttons.

If you're looking for an automated tool that will convert your company's existing documents into electronic format, Guide is not it. On the other hand, Guide's expansion buttons and scripting language provide hypertext capabilities not available in other programs in its price range. Further, you should be willing to do a great deal of typing—and perhaps a bit of programming.

► **Guide Author, Version 3.1.** List price: \$800. Requires: 386-based PC or better, 2MB RAM, 2MB hard disk space (minimum install), Microsoft Windows 3.1 or later. InfoAccess Inc., 2800 156th Ave., SE, Bellevue, WA 98007; 800-344-9737, 206-747-3203; fax, 206-641-9367.

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The list items at the bottom of this GUIDE Author document window are expansion buttons.



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Sound Blaster 16 MultiCD™ preserves your freedom of choice! It will connect a CD-ROM drive from manufacturers such as Sony, Mitsumi, and of course, Creative Labs. This 16-bit card is upgradeable to Wave Blaster™ II or an Advanced Signal Processor, the advanced technologies for MIDI music and more demanding sound-enhanced programs.

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Of course, all Sound Blaster cards are easy to install and provide 100% compatibility with all software written for the Sound Blaster audio platform. Make your decision and visit your nearest Creative Labs dealer. Or call 1-800-998-5227 Ext. 111



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Ntergaid Inc.

• HyperWriter for Windows

BY EDWARD MENDELSON

HyperWriter for Windows, Version 4.01, can create beautiful and efficient hypertext documents, complete with the kind of special effect fades seen in presentations, and its files look almost identical under both DOS and Windows. The process of creating HyperWriter documents, however, is somewhat less than beautiful. If you don't mind working in a sometimes clumsy and counterintuitive development environment, Ntergaid's hypertext authoring package lets you perform tricks that rivals can't match.

You'd pay \$695 for either the Windows package or the DOS version. A read-only Macintosh viewer is due soon. The DOS and Windows versions include a builder/editor program and runtime viewer that you can distribute freely with HyperWriter documents. For \$3,995, HyperWriter Professional (not reviewed here) gives you DOS and Windows versions with options for the kind of branching links used in interactive training products.

THE WRITE PATH

A HyperWriter document is essentially a text stream divided into topics, which are organized under outline headings or as hypertext targets. The author can decide either to let readers scroll through the entire text or to force them to jump from a high-level heading to lower levels and back again. Tables of contents are not separate windows or files, but topics that consist of graphics or text links to other topics, and you can create multiple tables of contents—password-protected separately—to give different readers access to different parts of the same file.

When you click on a link, the table of contents or any current topic you may be viewing disappears and the topic associated with the link is displayed.

played. Press Escape and you return to the previous topic. But without a lot of advance manual work by the author, the reader can't keep a table of contents and other text on the same screen.

Each topic has its own properties that control navigation, security, and the membership of that topic in groups of topics, which can be separately indexed. By manipulating properties from one of Ntergaid's often baffling menus, an author can create documents that let readers step progressively down through several levels but jump back to the top level when they press Escape. Readers also can be required to enter a password before viewing a topic or changing it.

THE HYPER DOCUMENT

The author can give a HyperWriter document any appearance; it's possible to create text or graphic buttons and put them anywhere. The author may also select from one of the default button schemes. Document formatting begins with formatting imported from source files but can be modified in the builder using paragraph tags or direct formatting.

Each document's screen divides into scrollable text for each topic and a background, which is a frame around the scrollable text that can contain link buttons, graphics, and the name of the current topic. Each topic can have its own background or use the same backgrounds as other topics. The author of a document can lock the screen to any specified size to control text wrapping and graphics positioning.

Building and combining backgrounds and scrolling text windows are complicated tasks because HyperWriter's editing screens are modal, and the author can't see the text window while editing or creating backgrounds.

To attach a video clip to text, you have to switch between the text window and a background window that contains the anchor for the video. The author has to figure out where a Click Here message should be displayed in the text, then experiment till the anchor is in the right place. This may be fixed in Version 4.02, due by the time you read this. HyperWriter complicates the job by identifying backgrounds by number only; the next version will add an option to give backgrounds a name.

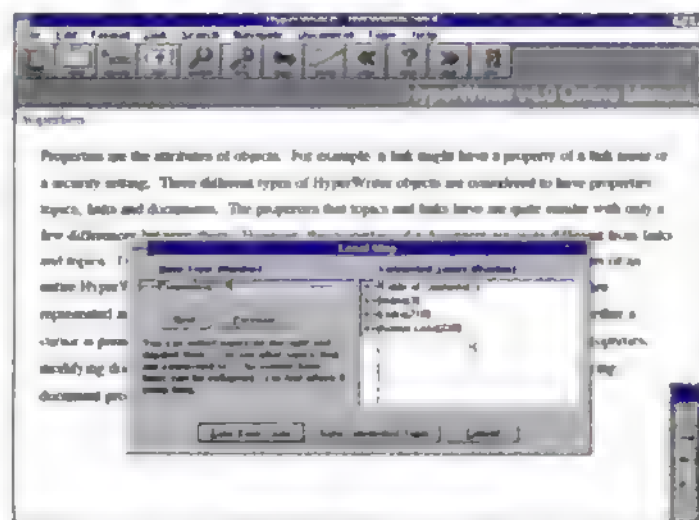
If the author permits, readers can attach pop-up notes to documents, and individual notes can be exported as ASCII or WordPerfect files.

The author can't incorporate these notes into the original document without tedious manual labor. Search queries with Boolean operators are entered in a daunting dialog box that lets readers narrow searches to specific categories and groups in a document or group of documents. Categories, which are defined by the author when compiling the index, are subsets of stylesheets and topics; one category might include all top-level headings, while another might include all text tagged "How Do I..."

HyperWriter imports from Ami Pro, ASCII, RTF, , and Ventura Publisher, WordPerfect 6.0 or earlier, and Word for Windows 2.0. Microsoft Word 6.0 support is due in the new version. The program crashed repeatedly with PC Labs' complex test files, but correctly converted simpler files into outline form. The program lacks OLE support, but you can import and play multimedia objects using its built-in player; call tech support the first time you try this. Compression using a separate, slow utility typically produces documents about three-fifths the size of the originals. The program can export in the HTML format used on the Internet.

The complex and confusing procedures in HyperWriter's builder aren't for beginners, but advanced corporate publishers can use it to create thoroughly customized and easy-to-use documents.

HyperWriter's modal editing screens make combining backgrounds with scrolling text boxes a more complicated task than it should be.

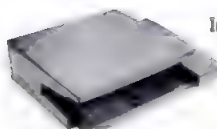


HyperWriter offers tools for visualizing complex relationships of text regions.

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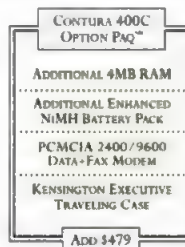
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ments that display on both DOS and Windows platforms. And with no royalties or separate reader software to buy, the cost of publishing with HyperWriter is trivial.

► **HyperWriter for Windows, Version 4.01.** List price: \$695. Requires: 4MB of RAM, Microsoft Windows 3.1 or later. Ntergaid Inc., 60 Commerce Park, Milford, CT 06460; 800-254-9737, 203-783-1280; fax, 203-882-0850.

Circle 481 on reader service card

Lotus Development Corp.

● Lotus SmarText

BY EDWARD MENDELSON

Lotus Development Corp.'s Lotus SmarText, Release 3, looks dazzling on screen, provides display and organization options that you won't find in other hypertext authoring programs, and can automatically create hypertext links instead of making you create all links by hand. Unlike other authoring programs, SmarText doesn't modify or duplicate your original data files but references them and adds a sheaf of control files. If you accept the inconveniences of SmarText's method, you won't find anything to match its appeal.

SmarText comes in two forms. SmarText Builder, with an estimated retail price of \$299, lets you create electronic documents, and SmarText Reader, with an estimated price of \$79, lets you read documents created in the Builder.

SMART AND SMARTER

A SmarText "document" consists of the original separate data and graphics files, outlines, and text indexes, along with links to embedded objects. Even a simple SmarText document includes a dozen control files in addition to the original data files. When distributing a document, the author uses a menu inside the program to package and optionally compress the control and data files. The package can be copied and decompressed on another system.

If the author finds a misspelling while building a document, he has to open a word processor to correct the original, save the file, and then wait while SmarText processes the whole document again to rebuild its indexes. Although inconven-

nient, this method ensures that the source files and the SmarText files are always the same, thus preventing multiple versions.

The text of a document includes the original text but none of the original formatting except attributes such as bold and italic. You select all fonts, sizes, and colors within SmarText and, if the author permits, the reader can change formatting at any time.

The screen optionally displays a text window, an outline window, and an index window, as well as a bookcase window for choosing documents by long names instead of DOS filenames. The text window displays a continuous text stream divided into paragraphs, with graphics, tables, and icons representing multimedia objects appearing between paragraphs. But the author can't place more than one graphic in a line. The outline window lacks a toolbar for expanding and contracting levels. When the reader clicks on an outline heading, he moves to the matching position in the text. A "link history" menu lets the reader retrace steps, and authors can make the Reader program report a log of reader actions.

SmarText allows multiple views of the same document. The default view displays the full text of the original files in the order the author chose when importing them. A menu lets a document's author create alternative views that start out as identical to the original but which the author can modify by moving or deleting headings (and their corresponding text) in the outline window.

An Autolinks feature automatically scans a document and links occurrences of words that the program selects according to frequency. The program isn't very smart in its selection of words to link, but the author can customize links.

Authors can create multiple indexes for the same document. An automated index includes words selected by the program on the basis of frequency, while separate manual indexes are based on terms

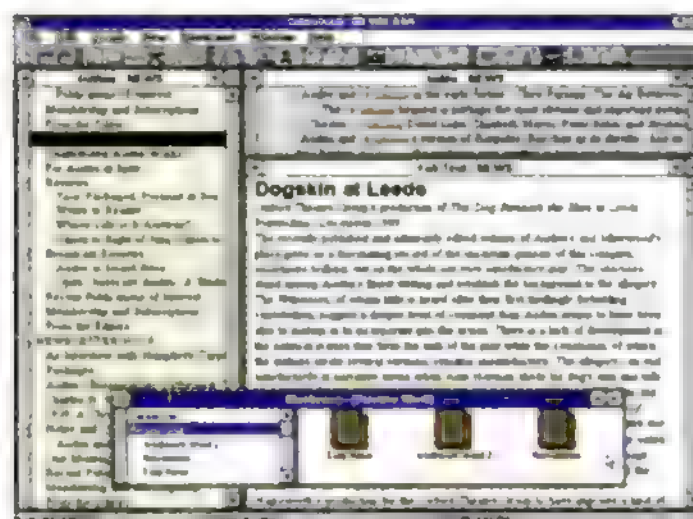
the author types in or imports from a list. When a reader clicks on the View Index option, a menu asks which index to display. An index keyword is easily linked to a Boolean query, so when a reader looks up a keyword, the program invisibly performs a complex search.

A reader can attach sticky notes to documents, and these remain visible only on the reader's workstation. Readers' notes can't be added to the original document without replacing the author's original notes.

TEXT FORMS

SmarText works with a limited number of formats, including WordPerfect 6.0 but not Word for Windows 6.0, so the author has to export Word 6.0 files to Word 2.0

format before using them. A menu lets the author map paragraph styles in the original files to outline headings displayed in SmarText. Graphics in most word processor files are ignored; graphics in Ami Pro files are recognized but have to be linked manually in the SmarText



SmarText can display a single window or a full set of text, outline, and index windows.

builder before they appear in the text stream. Spreadsheets as well as sound and video clips are copied to the clipboard from other applications and pasted into SmarText as OLE 1.0 objects. A SmarText document can also include links to documents in Lotus Notes databases.

Because SmarText preserves the original files and adds its own control files, a SmarText document is much larger than the original. A typical set of control files for 3MB of original documents occupies 500K—for a total of almost twice what Folio Views needs. But SmarText is reasonably fast at creating indexes, outlines, and other control files.

For authors who don't care about original formatting, and whose files are already in near-perfect shape, SmarText is uniquely flexible. Its builder and manual have some counterintuitive patches, but the program's oddities are easily learned. Limited security and import features and

the inability to edit text directly make SmarText an idiosyncratic environment to work in, but its views and indexes can make it an ideal platform for corporate publishing.

► **Lotus SmarText, Release 3.** Estimated street price: *Builder*, \$299; *Reader*, \$79; *upgrade*, \$105. Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. Lotus Development Corp., 1000 Abernathy Rd., #1700, Atlanta, GA 30328; 800-831-9679, 404-391-0011.

Circle 482 on reader service card

Oracle Corp.

● Oracle Book

BY CRAIG STINSON

Oracle Book, Version 2.0, is a hypertext authoring package designed to operate in client/server and multiplatform environments. You can save documents as ordinary files or as elements of an Oracle 7 database (Oracle's flagship product, a SQL database server). The Oracle 7 link facilitates security management in access privileges and backup, and may be more convenient for users who regularly work with Oracle database servers.

Version 2.0 is available on Windows 3.1 and Sun Motif. Versions for Macintosh and character-mode Unix are scheduled for the first half of 1995. Documents created in Oracle Book may be read on any supported platform; the system makes reasonable font substitutions where mismatches between the author's and reader's platforms occur.

Oracle Book's \$400 suggested retail price includes the authoring module (Oracle Book Designer) and one runtime unit. Additional runtime units cost \$40. The runtime component lets users read, annotate, add bookmarks, and customize Oracle Book documents.

BUY THE BOOK

Oracle Book provides more than 80 filters, accommodating source files from

Word for Windows (through Version 2), WordPerfect (all Windows and DOS versions), Ami Pro, FrameMaker, and many others. It also supports RTF. The absence of support for Microsoft Word for Windows 6.0 is a significant deficiency. Images in source documents are converted to .CGM and embedded in a file that is later converted to the finished document format. Video clips may also be linked to the document.

Integral to the system is an elaborate tag language, described by Oracle as "99 percent SGML-compliant." The word processor filters map direct formatting and named styles in source documents to Oracle Book tags, generating one or more intermediate files. These tagged files are then compiled into a finished hypertext document. If the imported tagging is not sufficient, authors can create tagged intermediates to achieve a finer level of control. Conditional tags, for example, can be used to display text alternatives based on the reader's operating system.

Heading styles and index entries in Microsoft Word source files are automatically mapped to a table of contents and index in the finished document. By default, the system builds its table of contents from first-, second-, and third-level headings, but you can expand the table to include lower-level heads. This automatic mapping is a great convenience. Authors

working with other document sources must do the mapping themselves—by generating tables of contents and indexes using the product's Filter Definitions tool. Here, a list of all direct and named formatting entities in the source document is displayed; you can

associate formats with Oracle Book tags.

In the runtime unit, readers navigate by means of a top-positioned icon bar, hypertext links, the table of contents, the index, and reader-defined bookmarks. The icon bar includes buttons for moving by the screenful or directly to sectional endpoints. A Go Back button records all

jumps in a session and lets readers retrace one step at a time.

If the author chooses, Oracle Book will generate a full-text index of all source documents. This index (not to be confused with the conventional topic index, which is generated by the system's tag language) permits lightning-fast reader searches. But

Oracle Book remains particularly appealing for users of Oracle 7 and for those with existing documents that are in SGML format.

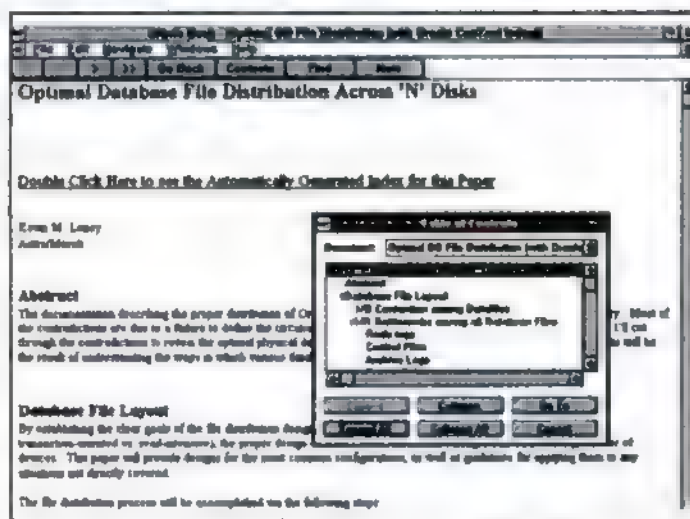
the index adds significantly to both the final document's size and its compilation time, and without the index, the runtime unit includes no search facility at all.

We encountered problems with Oracle Book's Word for Windows 2.0 and .RTF filters. The program labored for more than three hours to compile our test document, a 58-page Word 2.0 file with lots of tables and graphics. The finished document stopped on page 7, at a table heading. A smaller file in .RTF format compiled to the end, but dropped all source formatting about midway through the file. Smaller files in other source formats compiled without a problem.

A spokesperson for Oracle acknowledged flaws in the Word 2.0 and .RTF filters and said the company was taking steps to eliminate the problems for its upcoming 2.1 release, which will include a filter for Word 6.0. Meanwhile, Oracle Book remains particularly appealing for users of Oracle 7 and for those users with existing documents that are in SGML format, or in any one of the word processor formats that Oracle supports.

► **Oracle Book, Version 2.0.** List price: \$400. Requires: 386-based PC or better (486 recommended), 8MB RAM, 25MB hard disk space, Microsoft Windows 3.1 or later. Oracle Corp., 500 Oracle Pkwy., Redwood Shores, CA 94065; 415-506-7000; fax, 415-506-7200.

Circle 483 on reader service card



Oracle Book can generate a table of contents from headings in your source documents.

SGML AND HTML



Tag Masters

Using tags to enforce style and content, SGML and HTML let you create any type of document. While the possibilities are great, the implementation can be difficult.

By James Karney

At some point in your PC travels, you may have heard the term SGML (Standard Generalized Markup Language) and wondered what it was and whether it would have any effect on your work. Until recently, SGML's use was limited to military and other large-scale applications. But now, this formerly obscure international standard (ISO 8879) is poised to change the way you work with information.

Actually, you may be more familiar with SGML than you think. If you've ever surfed the Internet and accessed the World-Wide Web through Mosaic, then you've worked with HTML, a subset of SGML. But ask anyone who's involved with SGML, and they'll tell you HTML is

just a melody compared to the full concerto that is SGML. Now Microsoft, Novell, Xerox, and other major names in the PC industry are jumping on the bandwagon. Full-blown SGML is rapidly becoming the standard for managing, distributing, and publishing documents. In fact, on-line documentation for Novell NetWare is an SGML product.

WHAT'S IN AN ACRONYM?

SGML is the product of more than ten years' work. The goal was to produce a set of rules for describing the structure and managing the content of any digital document.

SGML isn't an application in the traditional sense. You can't buy it, and it isn't the property of any vendor or govern-

ment. It's an open standard, a set of rules about how to organize documents, and a shared technology. There's no fee for using SGML, but there is expense: in learning how to use it well and in obtaining applications that can harness its power. It's not just a new way of doing desktop publishing; it's a new paradigm for working with information.

A key difference between SGML and other publishing applications is that SGML is concerned with the structure and content of data but not its appearance or presentation. SGML is designed to deliver information in a format that's free from operating-system and application-software format restrictions.

SGML AT WORK

SGML documents have three parts. First is the *declaration*. This is a header file that contains the system-specific information needed to run the document on the target system. It says which character set (ASCII, for example) will be used. The second component is the *document type definition*, or DTD. The DTD is a tree structure for the document. Although a written DTD is expressed in programming shorthand, most DTD tools display the shorthand as a visual tree to make life easier. The principal purpose of the DTD is to declare the hierarchy of document *elements*. Each element in turn can be modified by *attributes*, which allow an element to take on a specific value. For example, an SGML tag has the element name “title,” and that title is assigned a security level of “secret” (a security level is allowed in this DTD); the author intends this paragraph to be secret. When the document is published, those readers without “secret” security-level clearance are locked out of that paragraph.

When a live document is created, the user must observe the tree hierarchy declared by the DTD. Every document produced using a specific DTD must strictly abide by the structural rules. For example, if the DTD declares that the section title must come after a chapter title and never after a paragraph, then no other sequence is allowed in the document.

Every document produced in SGML is marked up (tagged) precisely with the element and attribute names. The tags usually use angle bracket delimiters, as in

Illustration by Jerry Blank

<tagname>. The DTD also contains information about the type and use of any non-text or external *entity* that is to be contained in the publication. (An elaboration of SGML called HyTime details a method to declare entities and objects such as video and music.)

The final part of an SGML document is the *document instance*. The instance is the actual text and its accompanying tags conforming to the specifications and restrictions set forth in the DTD. It's important to understand that all element and attribute tags (as well as their structural relationships) are specifically defined in the DTD. Different tagnames and structural relationships exist for each DTD. In the world of SGML, there is no standard tagging system for documents.

At present, creating a full-blown SGML implementation means that you have to plan document structure in advance, and write the DTD based upon the structural requirements of the document. Until recently, this work has been the domain of consultants, but new, powerful PC products are coming to market to au-

tomate the process. Many industries are now creating standard DTDs for their most common applications, such as technical documentation or routine reports.

Once the DTD is in hand, you need an SGML editor that you can use to enter data and easily navigate the document based on the tag structure. The SGML editor also includes a *validating parser*, which makes sure that your document instance conforms to the requirements of the DTD. Dedicated editors—ArborText's ADEPT Editor is an example—are already on the market. This year we can expect to see SGML editors contained within Microsoft Word for Windows, WordPerfect, and other popular word processors. There is a host of vendors offering tools, training, and products, including an industry consortium—SGML Open in Coraopolis, Pennsylvania (412-264-4258)—and the public ISO standards group. The Graphic Communications Association in Alexandria, Virginia (703-519-8160), is a good source of information.

The end use of an SGML publication is realized through a *transformer*. This is the

tool that changes a document from SGML into a format that the client can use to print, edit, view, cut, paste, search, or link with another application such as a database. Simple transformers are mere viewers or browsers. The better ones can do all sorts of fancy tasks in addition to just formatting output.

HOW WE TESTED

The three principal products in this evaluation are SGML editing tools, which should allow easy data entry, provide the ability to support the standard fully, and open a pathway to its power. Our examination of the current crop of editing tools began with the creation of a DTD outlining a simple memo with seven elements, which included two entities (a signature block and a logo drawn from a vector graphic file). We used our DTD to create a document instance complete with two graphics, then corrupted the DTD and the actual document to see how the product handled errors.

Next, we used a Department of Defense 38784C DTD and an accompanying

SGML at Work

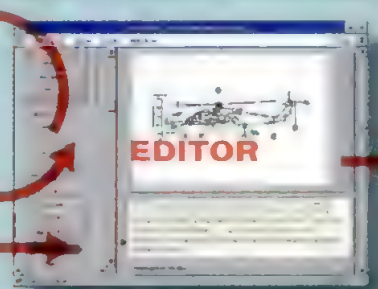
The **document type definition (DTD)** is the map of the document structure. It sets forth the rules for marking up text, and it names the tags that are to be used and the methods for handling any non-SGML data



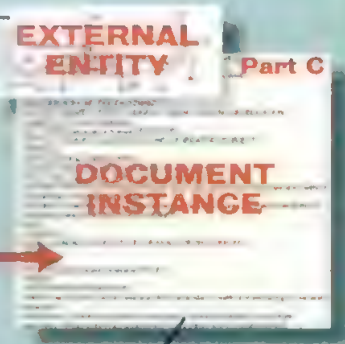
The **declaration** is a list of rules for handling the system-specific requirements—for instance, the allowable characters and the characters that must be avoided (such as Ctrl-Alt-Del on a DOS-based PC)



Any graphics or other non-SGML objects that are part of the compound document (SGML and non-SGML objects) are referenced as **external entities**. These elements are not embedded in the final document



The actual tagged text—what we normally think of as document content—is located in the **document instance**. The text must be tagged to conform to the rules of the DTD, and this is usually checked with an SGML validating parser.



The **transformer** software (usually customized to understand your industry's DTD) changes a document from SGML into a format that the client can use to print, edit, view, cut, paste, search, or link with another application, such as a database



An SGML document is composed of three parts—the DTD (A), the declaration (B), and the document instance (C). All are plain ASCII text.

A formatted SGML document—also known as a **format output specification instance (FOSI)** in SGML parlance—is based on the SGML document instance. SGML has no direct method of producing formatted output

document instance replete with tables and graphics, and we tested the strength of the editor by creating a table, setting attributes, and adding references to external entities. This took us into the realm of more difficult SGML features and operations. None of the three products had the ability to produce equations or fully format hardcopy output, so we omitted this part of our test scenario.

STAY TUNED

SGML on the PC is still in its infancy, but it's showing enormous potential, as witnessed by the explosion of HTML and Internet publishing. The core technology of SGML isn't limited to traditional publishing; it will be used to create a new class of intelligent documents. In fact, SGML may well be the enabling tool for full-fledged information engineering.

Remember, this market is changing quickly. The products reviewed here are first-generation tools. The commercial sector's increasing interest in SGML publishing, the rapid growth and popu-

larity of HTML as a means of using the Internet, and the release of SGML interfaces for Microsoft Word and WordPerfect will dramatically increase the integration of SGML into our everyday computing lives.

ArborText Inc.

● Adept•Editor

BY JAMES KARNEY

ArborText's Adept Series is the most robust of the three products we tested, offering a comprehensive set of tools for creating SGML publications. Adept•Editor, Version 5.2/W, produces SGML documents, while the companion Document Architect is a DTD creation and editing tool. There are all kinds of navigation tools and DTD examination aids.

FRIENDLY INTERFACE

Adept•Editor resembles contemporary Windows word processors; it's replete with toolbars and drop-down selection lists. It offers a collection of SGML and

hypertext tools that make navigating the document structure and performing SGML editing relatively easy. There's also a table editor with support for both CALS and ArborText tables. While mastery will require training, you can become fairly proficient by working through the included tutorials.

We had no problems importing our test document into Adept•Editor, and the built-in SGML parser properly curtailed our efforts to enter invalid elements within the document. Drop-down lists include selections for adding elements and entities, collapsing a division of the document structure, and moving a bookmark. Our only complaint was the lack of labels or other aids in determining which icon or drop-down list serves what purpose. There are 20 standard toolbar icons and five drop-down list boxes, some of which will seem obscure to a novice user. On the other hand, the dialog boxes are quite clear, and the help facility contains clear and concise explanations—including definitions of SGML terms. The table editor included in

The Naming of Names: A Short SGML Glossary

attributes Properties of elements within a document. They add additional intelligence to a document by improving navigation and performing actions similar to triggers in a database.

content model A description of the permitted elements and subelements within a higher order element. For example, a book is a high-order element that could contain front (table of contents, body text, and chapters) and back matter (appendices, glossary, and index). The body is a lower-order element containing paragraphs, lists, figures, and so on. Paragraphs can be reduced to character data—letters and numbers.

CALS Continuous Acquisition and Lifecycle Support; A government-sponsored initiative to use high-level automation technology (including SGML) in the procurement, development, and maintenance of weapons systems. It has kept the same acronym, but the meaning of the letters has changed several times.

declaration A text file that regulates the low-level aspects of an SGML document: the character set being used, the SGML options that are allowed, and

any system-specific codes that must be used or avoided.

DTD Document type definition; A set of rules defining the structure of a document and listing all permissible elements and any external entities or references.

document instance This is the actual tagged text. It is related to a specific DTD that contains definitions of the tags used within it. There are no actual graphics or other nontext objects within the file; they are handled as external entities.

elements Units of a document specifically identified within the DTD. The tags used to identify information within a document take their names from the element definitions within the DTD.

entity An SGML object or place holder that defines a nontext part of a document, frequently used text, or a block of text that will vary based on a certain condition.

FOSI Format output specification instance; This is a formatted document based on an SGML document

instance. SGML has no direct method of producing formatted output.

Hypermedia/Time-Based Structuring Language (HyTime) Also known as ISO 10744, this is the standard that extends SGML technology into multimedia publishing.

SGML document In the world of SGML, a document is an information container—not formatted hard copy. A full SGML document has three parts: the declaration, the document type definition (DTD), and the document instance.

SGML validation parser A program engine that can compare the DTD to the document and make sure that the structure is being followed or check the structure of a DTD to make sure it does not contain any errors.

tags Labels identifying an element within the document instance. Usually, tags are set off with angle brackets like this: <tagname>. At the end of the text another tag with a slash usually marks the end of the element.

—James Karney

the package made short work of our test example, helping us to define its structure and enter data. We could add an entity and set a marked section without difficulty.

ArborText has added several features that can be used to make your work more productive. The command language is always available for directly manipulating your document. All functions can be accessed with it, and a savvy user can create

produce, modify, and test DTDs, as well as generate FOSIs. We designed a sample DTD for a memo and added an external entity without problems. The program also caught and noted our deliberate errors and offered reasonable suggestions for repair. The FOSI engine lets you create multiple specifications for a single DOCTYPE (document type), so you can produce different formats for the same information.

ROOM TO GROW

Both Adept•Editor and Document Architect still need improvement, as they lack features available from ArborText on other platforms. Don't expect to do equations in Windows. The ArborText equation editor that works so well on the Unix platform wasn't included in this release, so we couldn't try our test equation. ArborText has promised it in a future release.

A major shortcoming for total Windows production is in

tronic composition and publishing using the TeX markup language. This language is the basis for its formatting engine in Adept•Publisher. The program hides the TeX commands and lets you produce complex compound documents. When Adept•Publisher for Windows is released, ArborText will be one of the first vendors with a complete SGML publishing and composition solution for the PC. The strong features and well-designed interface make Adept the one to watch if you are considering a move to SGML.

► **Adept•Editor, Version 5.2/W, and Document Architect for Windows 5.2/W.** List price: Adept•Editor, \$1,350; Document Architect, \$4,950 (includes one license for Adept•Editor). Requires: 386-based PC or better with 8MB RAM (486-based PC or better with 16MB RAM recommended), 25MB disk space, VGA or better, and Microsoft Windows 3.1 or later. ArborText Inc., 1000 Victors Way, #400, Ann Arbor, MI 48108-2700; 313-996-3566; fax, 313-996-3573.

Circle 472 on reader service card

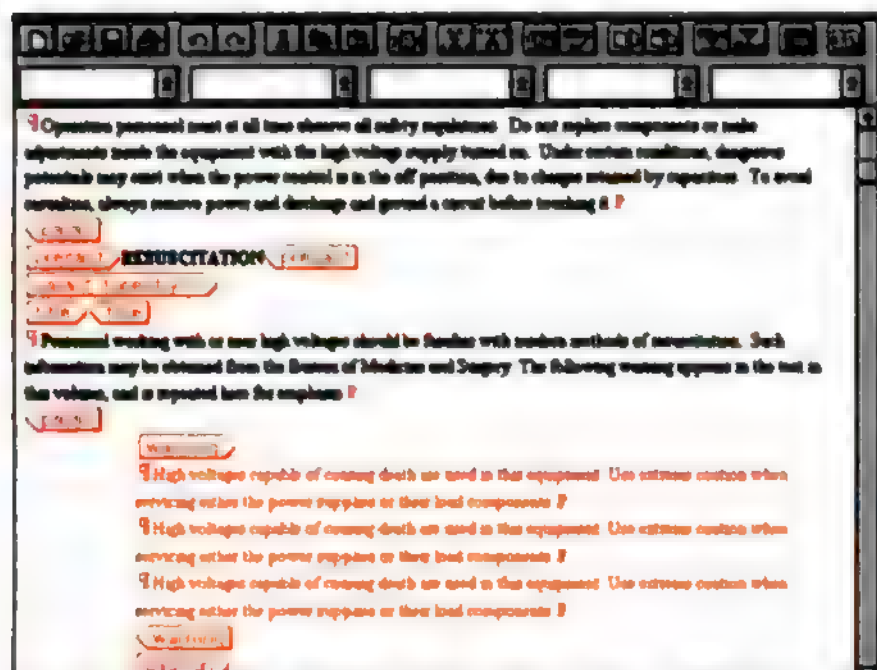
SoftQuad Inc.

• Author/Editor

BY JAMES KARNEY

Author/Editor, Version 3.1, SoftQuad's flagship product, is just what its name implies. This \$995 package is an automated authoring environment for producing SGML document instances. It's a good choice for organizations that need to produce SGML documents and that aren't worried about getting formatted output from the editing program. Author/Editor has few provisions for producing hard-copy documents; it's aimed at making the task of entering SGML data as easy as possible. You can create templates that automatically set up your document, as in a traditional word processor. The difference is that this program makes sure that you conform to SGML structure based on the DTD being used. The other SGML authoring tools work the same way.

SGML tags can appear in the work area, or they can be hidden. You can use screen-based styles to differentiate the appearance of elements within a document, making it easy to navigate and edit without seeing the tags. Author/Editor provides direct support for the SGML



ArborText's suite of SGML applications offers a Windows-style interface and a robust toolkit for creating DTDs.

entire applications to automate production. A hypertext table of contents that can be used to navigate a document is also provided, and there's a DTD viewer that displays the document structure while you're working.

If you want to edit, customize, or use a DTD with Adept•Editor other than the samples supplied with it (these include standard samples for CALS, ArborText tables, and tutorial purposes), ArborText suggests using Document Architect. This is a combination of three modules: a DTD editor, an automated design module for creating Adept publishing applications, and a style editor. A binary DTD compiler is also included. ArborText representatives program special compiled versions of DTDs to offer links for the package's advanced features (such as bookmarks and navigational aids), and for making the authoring process more productive. You also need Document Architect to produce FOSIs (format output specification instances) for either the screen views or for hard copy.

The Document Architect package, like most DTD authoring tools, requires a firm grounding in SGML theory. The package has all the features needed to

formatting hard-copy output. We were unable to produce multicolumn output or add headers and footers beyond the native Windows printer support. Adept•Publisher, the companion formatting module, isn't expected in a Windows version until late this year. You can, of course, use the UNIX edition to work with files produced under Windows. Neither of the other two packages we reviewed had direct support for typographic composition, so it's worth noting that ArborText does at least have some support built in.

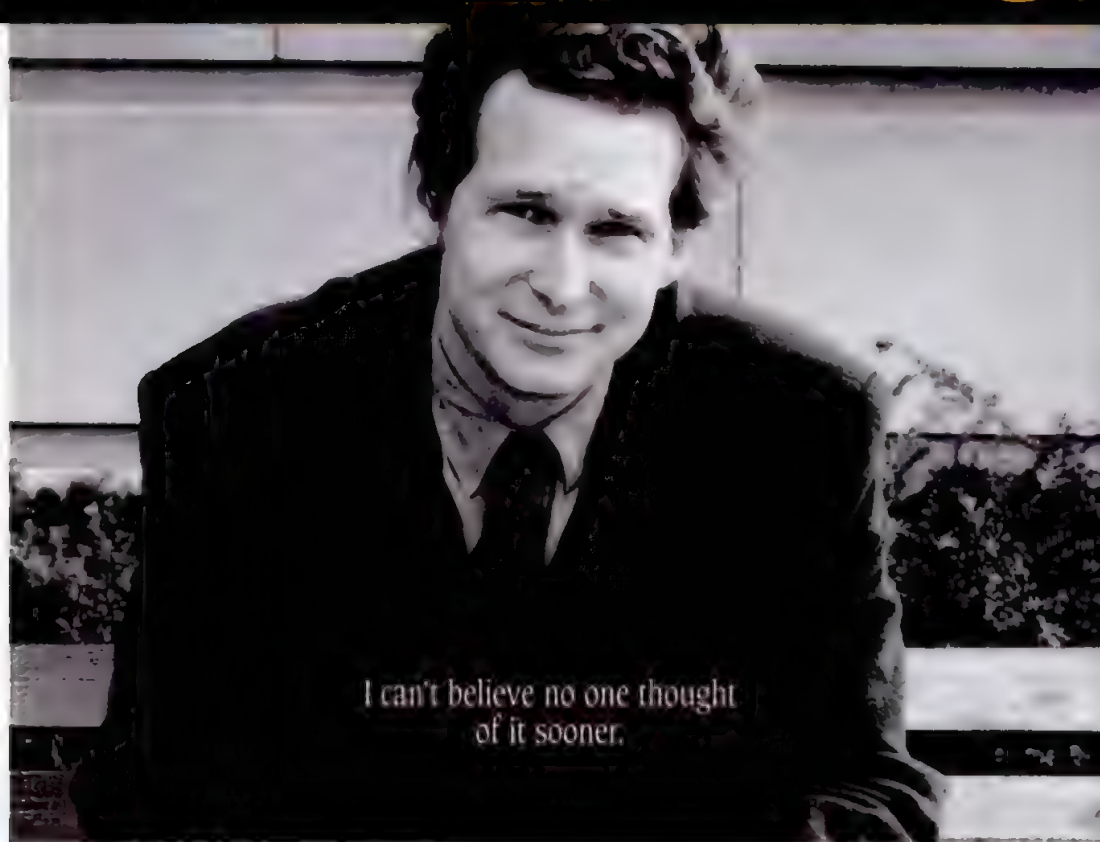
You can place references to external graphics files and view a variety of graphics on-screen. The actual graphic isn't placed in a document, but is referenced (and, if the file type is supported, displayed on-screen). Adept supports in-line display of .BMP, .EPS, .PCL, .PCX, TIFF, and .WMF images, as well as a variety of UNIX formats. You can, of course, include other images or objects in a document as SGML external entities. The Adept dialog box accepts all the required information for an entity reference and adds the proper statements to the document instance and to the program's entity map file.

ArborText has strong roots in elec-



I instantly felt comfortable with
my new computer.

OUBE: Making

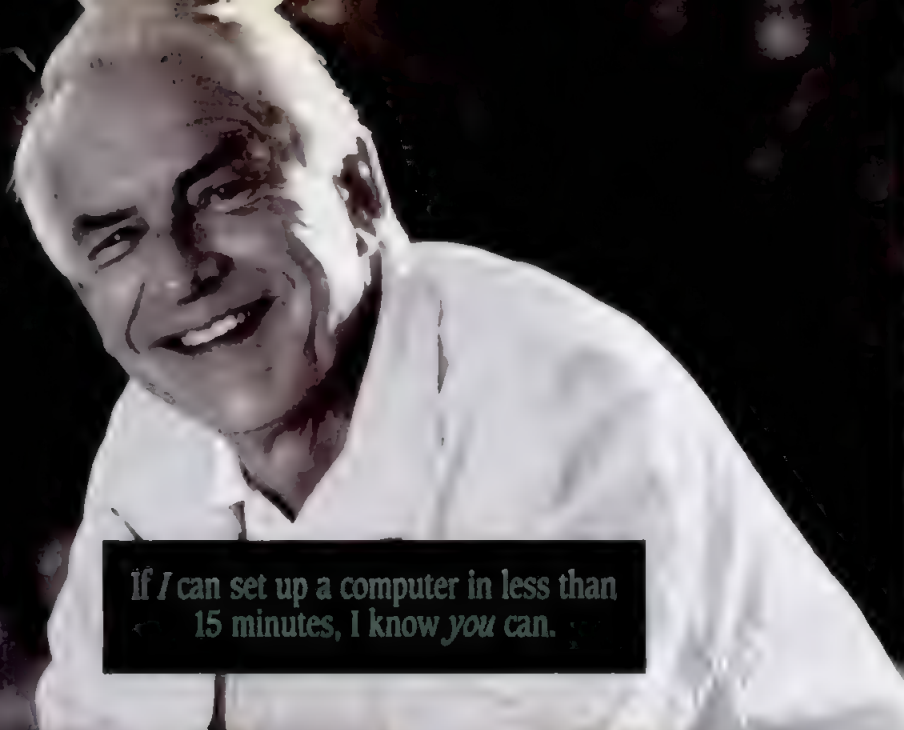


I can't believe no one thought
of it sooner.



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PC Magazine, Dec. 20, 1994

"OOBE is the Holy Grail..."

PC Magazine, Dec. 20, 1994

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CIRCLE 273 ON READER SERVICE CARD

HTML: *Nothing but Net*

By Sean González

Hypertext Markup Language (HTML) is the language understood by browsing programs that read the Internet's World-Wide Web, and that makes it important.

With a tagging style somewhat reminiscent of early mainframe desktop publishing systems, this language may, to a publisher, seem more like a distant relative than a total stranger. HTML is based on SGML (Standard Generalized Markup Language), though the two can't be used interchangeably. The following HTML shareware, freeware, and commercial applications can help you create Home pages and full-blown documents for publication on the Web. The power of an HTML document is that it can be linked to any other document or element on the Web, creating, in essence, an extremely powerful hypertext application. For example, if you mention a technical term, you can link to a page that describes that term, or even an image of a piece of equipment that uses the technology. (See "Untangling the Web" in this issue for coverage of the Web browsers themselves.)

REINVENTING THE WHEEL

Each HTML tool is so different—and there are so many of them—that investing some time to choose the right tool or tools is important. Some of the products are freeware packages available on the Internet; others are commercial packages you can buy from the vendors.

Because HTML standards are still being defined, programmers have a hard time ensuring that their products support all the latest features. It's wise to select a tool developed by programmers who are willing and able to include new features as soon as HTML standards define them. Otherwise, you may be forced to move to another tool down the road.

Currently, there are four levels of

HTML compliance: 0, 1, 2, and 3. Levels 1 and 2 are supersets of Levels 0 and 1, respectively. It hasn't yet been determined if Level 3 (also known as HTML+) will also be a superset of previous HTML definitions. At press time, Level 3 was still not available.

We found that most HTML tools don't explicitly state their level of HTML compliance. Most likely, an



HoTMetal clearly displays HTML tags and URLs, making it easy to distinguish them from the rest of your document. You can hide them for a WYSIWYG view of your document.

HTML Level 1 compliant tool will suit your needs unless you're looking for interactive forms support, in which case you want Level 2 compliance. More information is available on the Internet at <http://info.cern.ch/hypertext/WWW/MarkUp/MarkUp.html>.

HOTMETAL PRO

SoftQuad's \$195 HoTMetal Pro V1.0 is a leading-edge technology HTML editor that includes a spell-checker; thesaurus; HTML-file-import filters, which you can use to correct common HTML document mistakes automatically; an HTML-document-validation feature, which will guarantee your documents are error-free; a preview command, which lets you test your document with your favorite Web browser; and a publish command, which replaces Universal Record

Locators (URLs) that reference your local hard drive with the real URLs. You can configure HoTMetal Pro's WYSIWYG interface to show and hide URLs and tags, and tags are displayed using special icons instead of plain text. Graphics can also be displayed.

The most noticeably absent feature in HoTMetal Pro is a toolbar, but the program supports all HTML Level 2 tags (including experimental Level 3 tables and Mosaic 2.5 tables) in an easy-to-use, context-sensitive dialog box that won't let you place tags incorrectly.

The included templates will help the novice HTML editor become familiar with different types of HTML documents, such as home pages. Unfortunately, the program doesn't support printing (of either source or formatted HTML documents), but its powerful debugging tools will ensure that your documents are always error-free. (SoftQuad, 416-239-4801.)

HOTMETAL (FREWARE)

The freeware version of SoftQuad's HoTMetal Pro V1.0 is functionally similar to the commercial version, but you cannot use it for commercial purposes. The spell-checker and thesaurus are missing, but HTML-rules checking is implemented, and you can still count on this tool to avoid generating faulty HTML documents. You can't open existing HTML documents if they have any errors, and there are no filters to fix them automatically. To help you fix these HTML documents, the program indicates the error and the line number where it occurs. This version offers you an opportunity to get a feel for the interface and will help you decide if

you should get the commercial version (available at <http://gatekeeper.dec.com:/pub/nev/infosys/NCSA/Web/html/hot-metal>).

HTML ASSISTANT PRO

Brooklyn North Software Works' HTML Assistant Pro V1.5 (\$99.95) boasts an intuitive and well-designed toolbar that puts HTML tags a mouse click away. User-defined tools are also supported, so you can add new tags if they aren't already in the toolbar. The inclusion of URL creation and management tools is a definite plus. The interface asks you for all information necessary to facilitate the creation, use, and organization of URLs automatically. And you can build libraries of URLs from existing documents with just a couple of mouse clicks.

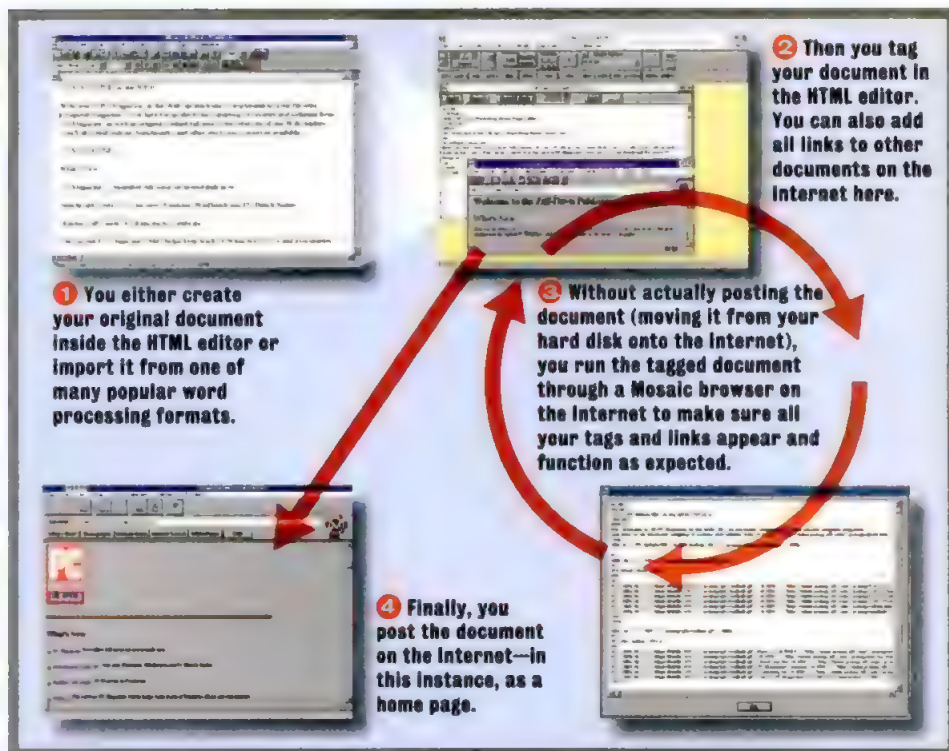
This program lacks a WYSIWYG interface, but you can invoke your favorite Web browser with the Test button to test your pages. HTML Assistant Pro does include filters that let you strip out all HTML tags and reformat the document to make it more readable. There's even an Undo option for the filters command. (Brooklyn North Software Works, 902-835-2600.)

HTML ASSISTANT (FREWARE)

HTML Assistant V1.4 is freeware. You still get the great toolbar and some of the URL management tools, but you lose the ability to extract all URLs from a document. The freeware version doesn't let you open files larger than 32K, and none of the document filters are included. If you are learning how to edit and create HTML documents, or if you have been managing your HTML documents with a plain-text editor, this tool will help you learn how to use HTML tags correctly and will speed up the tagging process (available at <http://cs.dal.ca/ftp/htmlasst/htmlfaq.html>).

SGML TAG WIZARD

NICE Technology's Microsoft Word for Windows 6.0 add-on, SGML Tag Wizard V1.2 (\$179.00), has a simple yet



well-designed toolbar that will help you build error-free HTML Level 2 compliant documents (although the HTML+ experimental tables are also supported). To access the product's toolbar and menu options, all you need to do is open a new Word document using the included template.

The toolbar has 12 buttons that put all editing tools a mouse click away, and the package's context-sensitive features help you build HTML documents quickly and easily. The Parse function checks for and highlights tagging errors, and it even corrects some common errors automatically.

To start or finish a tag, you click on the corresponding toolbar button. A list of possible tags is displayed alphabetically. We found that some secondary tag options are missing, so you have to edit tags by hand. Hiding the HTML tags gives you a very good WYSIWYG view of your document, which is useful for printing. You can't launch a Web browser from the program.

We weren't able to test SGML Tag Wizard for this review, but you can find more information on the product at

<http://infolane.com/nice/nice.html>.
(NICE Technology, 408-476-7850.)

ON THE HORIZON

As more companies embrace the Internet as the next publishing and advertising frontier, the industry is responding with better HTML authoring tools. Microsoft Corp. has announced the upcoming release of its Internet Assistant for Microsoft Word (freeware available through Microsoft's Web server at <http://www.microsoft.com>), due by the time you read this. Interleaf has announced Cyberleaf, a Windows package that should be out in the beginning of 1995. It will be available from the company and will sell for \$495.

Both Microsoft and Interleaf have focused on building HTML add-ons for word processors that will use editing techniques, such as translating text styles to HTML tags, to make HTML authoring as transparent as possible. Internet Assistant for Microsoft Word will take the process a step further by converting Word into a Web browser—you won't have to leave Word to browse Web content. □

Marked Sections feature via a dialog box. This lets you store more than one version of a document within the same file. It can be used to simplify production of manuals for similar products or manage version control.

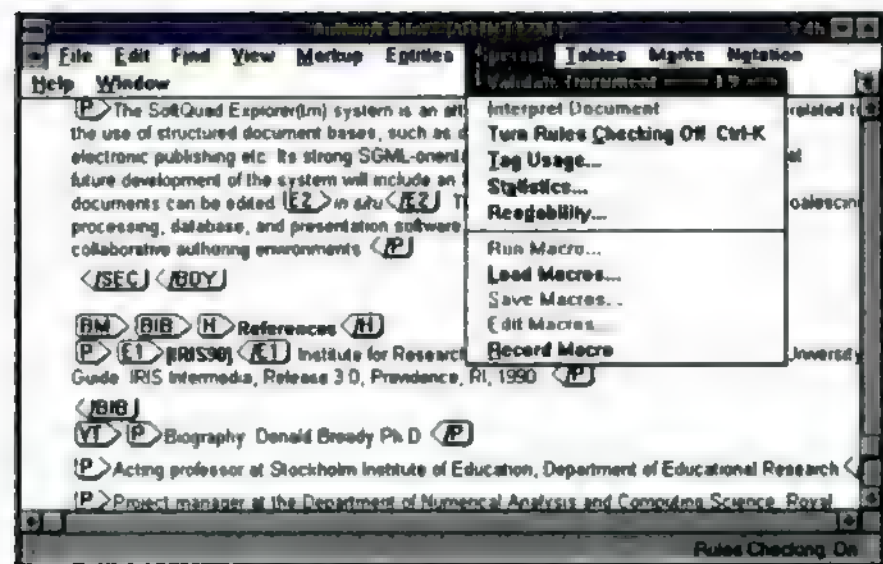
FOOLPROOF

SoftQuad uses its own parser in its products. We attempted to fool it on several occasions without success; the program forced us to correct all our deliberate errors. The parser can be temporarily dis-

abled, which made it very easy for us to work in a free-form manner while creating our test document. Some programs let you work with elements out of context, and SoftQuad's is a good compromise between mandating conformity and allowing creativity.

that weren't properly constructed during the import. We couldn't produce our test equation directly within the program, since Author/Editor doesn't have an equation editor.

SoftQuad's documentation is quite thorough, and the tutorial provides both a tool for learning the program and an introduction to the world of SGML. Those needing more in-depth training can take advantage of SoftQuad's training series, which covers not only program operation, but also DTD production and course work on SGML theory and practice.



SoftQuad's Author/Editor is the original SGML editor for Windows and lets the user create SGML document instances.

Less robust is Author/Editor's ability to handle graphics and format a document for printing. Only Windows .BMP files can be directly placed as entities and viewed within the document. You can, of course, reference external entities in traditional SGML statements but they are only placeholders. Viewing other file formats requires a separate viewer such as CALSVIEW for Windows (IGES Data Analysis Inc., 708-344-1815). Hard-copy format controls are almost non-existent. About all you can do is get a vanilla printout, with or without the SGML tags visible.

Author/Editor offers a spell-checker, thesaurus, macros, and table editor. We found the table editor easy to use but had some difficulty importing our test CALS table in our sample technical manual. We had to clean up the structure of two cells

that weren't properly constructed during the import. We couldn't produce our test equation directly within the program, since Author/Editor doesn't have an equation editor.

SoftQuad's documentation is quite thorough, and the tutorial provides both a tool for learning the program and an introduction to the world of SGML. Those needing more in-depth training can take advantage of SoftQuad's training series, which covers not only program operation, but also DTD production and course work on SGML theory and practice.

ADDITIVES

Don't think of Author/Editor as a stand-alone SGML solution. At the very least, you'll need a copy of SoftQuad RulesBuilder

3.0. This \$995 companion product is used to generate binary versions of DTDs that can be used with Author/Editor, since it can't make direct use of ASCII DTDs. Most organizations can get by with a single copy of RulesBuilder, since most users won't have to worry about creating or modifying DTDs.

RulesBuilder is shipped with a number of standard DTDs that can serve as starting points for your own document models. We used RulesBuilder to compile our test DTDs, and the compiled files worked without a problem in Author/Editor. You must remember to disable the DOCTYPE declaration at the beginning of the file to get the DTD to parse properly. To see how robust RulesBuilder was, we corrupted the structure of our sample DTDs, and RulesBuilder correctly pointed out our problems and indicated possible corrections.

SoftQuad also sells SoftQuad Sculptor 1.0, an Author/Editor add-on that provides a scripting language based on Scheme, a derivative of LISP. It can be used to create custom applications for SGML production. The company is also

moving into other areas related to SGML. (For more information, see the sidebar, "SGML: It's Still à la Carte.") SoftQuad is also producing a converter, SoftQuad SGML Enabler for QuarkXPress, which allows export of SGML documents into QuarkXPress, and another converter, SoftQuad StylesExchanger, for exchanging styles between Author/Editor and Electronic Book Technology's DynaText.

Author/Editor isn't the most robust SGML product we examined, mainly because of its lack of graphic display and internal hard-copy formatting tools. While these aren't absolute requirements for an SGML editor, they are highly desirable for many applications. Even so, SoftQuad has produced an admirable SGML tool worthy of serious consideration as part of a total publishing environment. The ease of use, navigation capabilities, and excellent tutorial are definite pluses. For those who don't need fancy formatting tools in an SGML editor (and those with full publishing systems often don't), Author/Editor is an excellent tool.

► **Author/Editor, Version 3.1, and SoftQuad RulesBuilder for Windows.** List price: \$995. SoftQuad Inc. (subsidiary of SoftQuad International), 56 Aberfoyle Crescent, #810, Toronto, ON, CD M8X 2W4; 800-387-2777, 416-239-4801; fax, 416-239-7105. Requires: 486-based PC or better with 12MB RAM (recommended), 386-based PC or better with 8MB RAM, 5MB hard disk space, MS-DOS and Microsoft Windows 3.1 or higher.

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XSoft, a division of Xerox Corp.

• XSoft InContext

BY JAMES KARNEY

One of the barriers to wide-spread implementation of SGML has been the lack of a simple tool for editing markup copy that still forces compliance with the DTD, and for printing the formatted publication directly. XSoft InContext 2.0 is a Windows-based application that lets relative novices edit SGML files with little training in the program or SGML theory. Users still need a general idea of how structured documents operate, a knowledge of how SGML tags work, and a basic understanding of DTDs. InContext

COVER STORY

Electronic Publishing

is available from two sources, XSoft and InContext Corp; XSoft's product, reviewed here, offers a version that is specially constructed to work with XSoft's CAPS system, a high-end SGML publishing system.

A BETTER CONTEXT

XSoft InContext 2.0 was the simplest of the three packages tested for this review, and it focuses directly on creating or editing documents and offering a means of formatting output. It lacks the DTD creation modules found in both Adept•Editor and Author/Editor. You must provide an existing DTD to work with InContext. Unlike Adept•Editor and Author/Editor, it does not require creating a binary version of your DTD to operate. Plain ASCII DTD files can be read directly into the program and used to create a document instance. So you could, for example, create a DTD with a word processor or a DTD design program like Near and Far (see the sidebar, "SGML: It's Still à la Carte").

The user interface has two distinct areas: the Content Editor and the Logical

Editor. The Logical Editor, on the left half of the screen, displays the document structure based on the tags defined in the DTD, and it adds new elements to a file. Each element is listed on a separate line with an icon display.

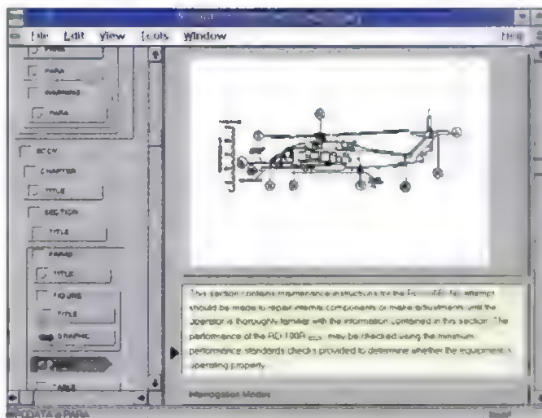
Only elements specifically allowed by the DTD can be inserted at a given point. InContext uses the SGMLS parser, which checks for compliance with the DTD. Clicking on an element selects the related

text and allows it to be edited. While you are working, InContext's icon in the Logical Editor displays information about elements on a line such as the type of data contained within an element, the relationship of the element to higher level elements, and basic information about the content model.

The Content Editor, on the right side of the screen, is used to modify the actual text of your document. To edit text you must select the appropriate location and

click within the Content Editor. With the exception of the limitations noted above, the Content Editor functions much like a word processor. You can cut, copy, and paste between elements and other Windows applications, but you must work within the Content Editor. InContext also provides a spell checker, a grammar checker, and even a thesaurus.

During our testing we loaded a DTD that defined a memo with several elements and two entities. We also im-



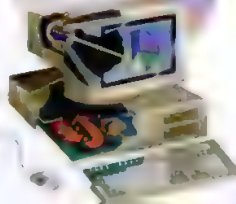
InContext is easier to use than its two competitors, but has no provisions for authoring a DTD.

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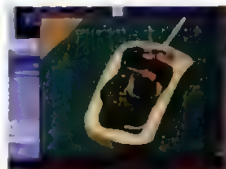


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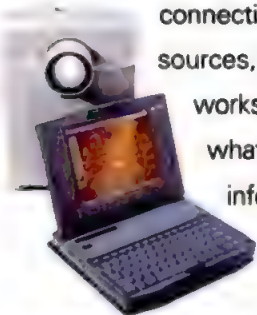
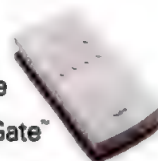


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ported an existing technical manual document instance, complete with graphics and tables, based on the Department of Defense 38784C DTD. InContext had no problem importing and displaying either file. We attempted to place improper elements within the structure, but couldn't. Whenever you try to insert an element, a dialog box pops up and tells you which elements are allowed. There's also a scratch pad window that can be used to work outside the confines of the DTD structure. We created several improper elements in this window, but the program refused to allow the additions to be added to the document instance until they were modified to conform to the DTD.

THE HEART OF THE MATTER

During our testing, we used OLE (1.0, client and server) to insert external figures created in Windows-based graphics programs (we used CorelDRAW and Photoshop). We had no problem exchanging and working with other OLE client and server products. SGML documents don't actually contain non-ASCII

elements, but draw them from external elements defined in the DTD. This function is a common limitation of basic SGML editing software, but InContext does an adequate job of handling it within Windows, and was a bit better than most.

Tables are handled using Microsoft Excel as an editor. Place a table element within your document, then click on the Content Editor. Excel opens, and you can create your cells. The finished table is linked to your document. If you wish to edit an existing table, Excel must already be running on your desktop.

InContext offers a straightforward method of formatting text for printing or exporting. You can use style sheets to specify page layout and text attributes such as font and point size, and to define headers and footers. Styles can be applied to all instances of an element or to a specific occurrence. InContext divides styles into character and paragraph. Character styles apply to the appearance of text; paragraph styles define things like indentations, leading, and justification. The Counter feature lets you de-

fine auto-numbering schemes that can be used with virtually any element. Style sheets can be saved and used with other document instances. InContext is closely linked with Windows Write, which is used to display print previews.

We found InContext very easy to use, and quite flexible as an SGML editor. To use the program effectively requires some knowledge of the standard and familiarity with the type of document being used. If your organization is contemplating an SGML system and you want an editor that won't take a week to learn to use, InContext is worthy of serious consideration. Combined with the right tools, such as a DTD editor and an auto-tagger, InContext can serve as the hub of an effective SGML production suite.

► **XSoft InContext 2.0.** List price: \$995. XSoft, a division of Xerox Corp., 3400 Hillview Ave., Palo Alto, CA 94303; 800-428-2995, 415-813-6920; fax, 415-813-7499. Requires: 386-based PC or better, 8MB RAM, 6MB hard disk space, Microsoft Windows 3.1, Microsoft Excel 4.0 (for CALS). Circle 474 on reader service card

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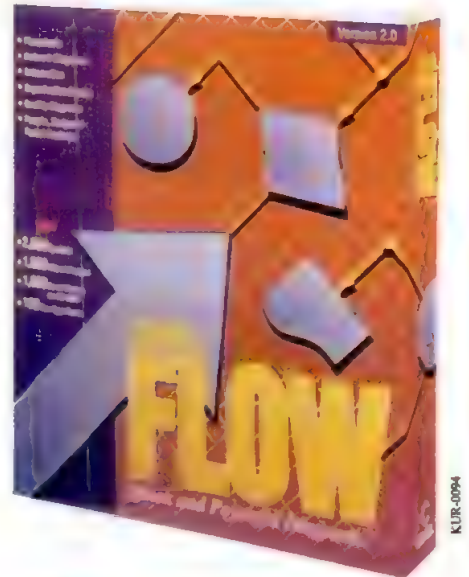
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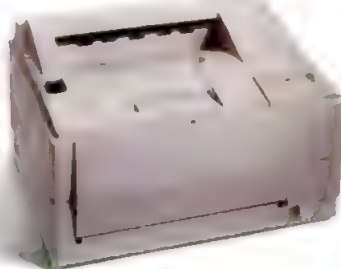
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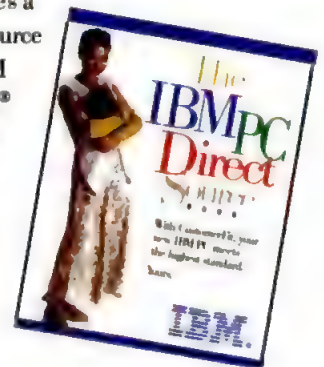
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SGML: It's Still à la Carte

By James Karney

In order to be a complete electronic publishing solution, an SGML system must include design, authoring, and distribution modules. The SGML industry has not produced this kind of integrated powerhouse, so buyers have to do a little studying and order à la carte. Nonetheless, the SGML world is changing rapidly. Until recently, any type of SGML solution required massive planning with the services of highly skilled (and highly paid) consultants and technicians. You still have to plan carefully, but new products are making the job easier and reducing the learning curve. Given the benefits of SGML and its intelligent documents, it's just a matter of time until SGML is a part of mainstream computing. Here we look at the state of the art by discussing products in the order they would be used in a production environment.

THE SGML LIFE CYCLE

There are three steps in the SGML publishing cycle: document structure design/analysis, authoring, and delivery. You start off with the document type definition (DTD); without a DTD you can't create an SGML document.

The DTD is a precise map of your document structure (elements) along with information on how to process objects (entities) such as graphics, sound, and video. Proper DTD design requires careful planning and analysis of your document. You must think through what the document needs to accomplish, how it's to be used, and what it will look like structurally.

DTD construction has traditionally been in the hands of consultants and programmers, but all that changed with the introduction of Near and Far for Windows, a beautifully engineered DTD de-

sign tool from Microstar (613-727-5696). You can start building your DTD from scratch or import an existing DTD for review and modification. A simple interface lets you drag and drop icons that establish relationships between objects, and expand or contract the document elements. Near and Far helps you analyze your document through an organizational chart interface, and writes perfect DTD syntax complete with proper comments.

We used Near and Far to produce our test DTD based on a memo with the typical structures, a table, and a bullet list. Within ten minutes we had a fully formed and tested DTD complete with comments. When we had completed our DTD, Near and Far produced an extensive report that listed and interpreted all of the elements and their relationships in the DTD. Priced at \$795 for the Windows version, Near and Far will pay for itself the first day it's used.

Microstar's CADE (Computer Aided Document Engineering—"kay-dee") Groupware (\$995) extends Near and Far's reach into collaborative design. CADE Groupware interacts with Near and Far, and acts as a groupware extension, allowing the team to discuss and work on the DTD via electronic forms. CADE Groupware is a Lotus Notes application that maintains a document element repository, which can include elements from several DTDs. Members of

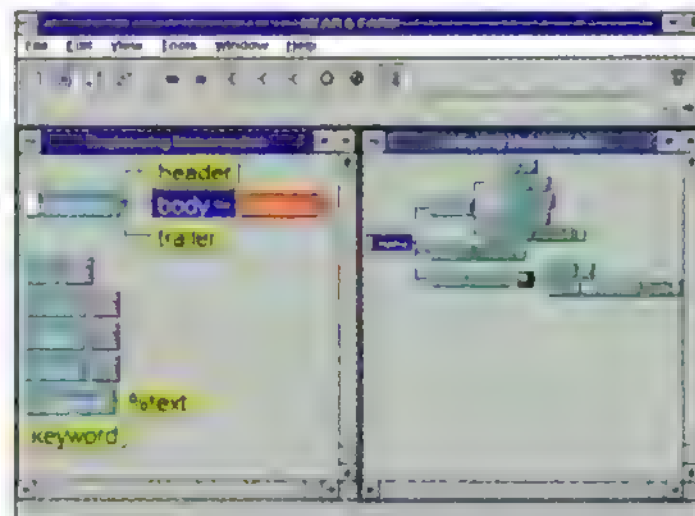
your design team can use non-technical forms to discuss possible elements and the structure of the DTD.

EASIER AUTHORIZING

After you build the DTD, you must author the "document instance," the actual text and objects that will result in a final publication. By the time you read this, both Microsoft (800-426-9400) and Novell/WordPerfect (800-451-5151) should be providing SGML authoring products based on their leading word processors. SGML Author for Word and WordPerfect Intellitag SGML Edition 2.0 were in early testing during our review. Based on demonstrations we were given, it's clear that the SGML-aware versions of Word and WordPerfect will give existing SGML authoring programs a run for the money.

Microsoft's SGML Author for Word lets users create tagged and validated SGML documents using Word for Windows styles. The initial setup demands knowledge of SGML; an administrator

must configure the program to work with a specific DTD. Typists work in Word for Windows, but are forced to adhere to the requirements of the DTD paragraph-level element structure. SGML Author won't let you violate the structural rules set down in the DTD. Drop down



Near and Far, with drag-and-drop tools, is a must-have package for anyone creating or modifying DTDs.

menus offer access to, and hints about, SGML tags that are legal at any given point in the document. The writer doesn't need to know anything about SGML.

SGML Author for Word supports SGML attributes, entity references, tables, equations, and markup minimization (allowing omission of most end tags). You can also create CALS tables. Since the tags are related to Microsoft Word styles, you can obtain formatted output. The package also supports the HTML DTD.

Because users are allowed to format text using Microsoft Word's style tools, it's virtually impossible to ensure that all text conforms fully with the appropriate DTD within the program. SureSTYLE is

a free add-on product produced by Avalanche Development Co. (303-449-5032), which is included with SGML Author and insures that all direct formatting changes are consistent with your DTD. SoftQuad (416-239-4801) is also offering an add-on to Microsoft's SGML Author. SoftQuad Enactor can be used to navigate and inspect an SGML file created in an SGML Author editing session.

Novell is readying WordPerfect Intelitag SGML Edition 2.0 for Windows, which supports bi-directional operation. The new version is linked to WordPerfect for Windows, rather than the DOS version. A layout generator is used to tie the formatting of a file to its SGML structure. Formatting can be based on either the element (making the appearance of that tag global), or on an SGML attribute (which provides local control of the specific text). Macros and templates can be used to automate much of the SGML environment. You can create tagging rules that free the author from most of the tagging chores, or produce forms that prompt the user for an appropriate entry.

SGML Author and Intelitag SGML Edition provide excellent methods of hiding a good part of SGML's gnarly appearance from the end user. Both include parsers that do not get in the way of free-form text entry, but do validate the document against the appropriate DTD once data entry is completed.

Neither product offers the same level of SGML functionality as the dedicated authoring systems from ArborText, XSoft, or SoftQuad. But not everyone needs those tools, nor can afford the training costs required to master them.

BEYOND AUTHORING

If you're contemplating the migration to an SGML environment, there is another consideration: legacy data. To gain full benefit, all active non-SGML data must be converted into tagged documents matching your DTD, and be compatible with your

viewing system. Enter the third category of SGML engineering tools, the auto-taggers. The best known players in this market segment are Avalanche Development Company, Electronic Book Technologies Inc. (EBT) (401-421-9550), Exoterica Corp. (613-722-1700), and Zandar Corp. (802-365-9393; fax, 802-365-4974).

Zandar Corp.'s TagWrite 3.2 is a sort of universal solvent for text formats; it can convert any RTF, WordPerfect, or ASCII file to and from any tagging system, including SGML and HTML, and it can move files from one tagging system to another.

TagWrite is set up through a template using English-type tokens for processing commands and simple syntax. We set up a sample RTF file and used TagWrite to convert it to SGML with about the same effort required to produce a WordPerfect macro. At \$199, it's a great value.

Avalanche's and Exoterica's solutions tend to be programming languages rather than applications. Both are sold with training and consultant services. They also include SGML parsers and a high level of SGML awareness. The programs require a lot of skill for SGML tasks, but in the hands of an expert can produce excellent results. Avalanche's FastTAG filter lets you convert documents from non-SGML to SGML; the company's SGML Hammer lets you move SGML material into word processing formats. Each product lists for \$3,500

and a \$700 annual fee.

Exoterica markets OmniMark, which is used to model information and then translate that data into virtually any format for editing or publication. We examined several OmniMark applications and worked with the Ex-

oterica tools. It was obvious that the command language offered a very robust environment for creating SGML documents and electronic publications. The package's ability to produce a detailed report of the target DTD, complete with analysis, is equal to that of Near and Far, although Near and Far offers a much better DTD creation environment.

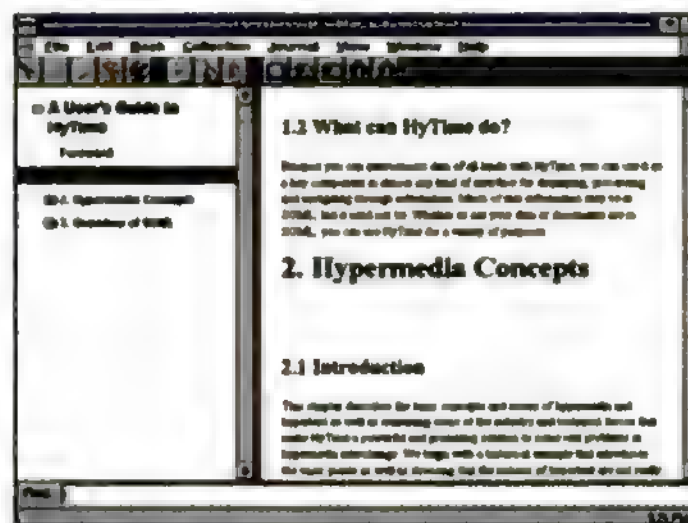
OmniMark has much to offer, but demands much in the way of training and resources. It costs \$2,495, with special pricing for bulk purchase. It's available on several platforms.

The other two products in this category take different approaches. EBT's DynaTag uses a point-and-click setup to create a style sheet for converting word processing files into SGML output. This product helps users produce data that can be easily imported into the company's companion product, DynaText. This is a full-fledged electronic delivery system for producing on-line electronic books. It's most suited to firms planning to use both products in concert with an SGML authoring system from a third party.

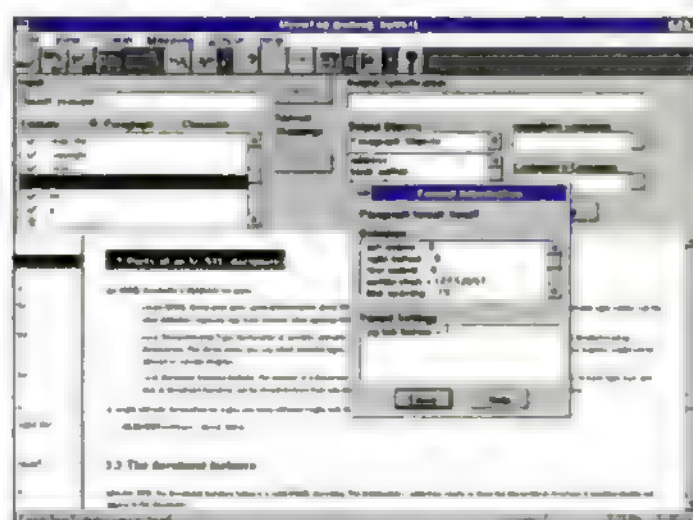
TRANSFORMING SGML

In order to use SGML, you must apply an application. Applying an application is like running a database-report routine that filters data and generates a document. Each application must be crafted to a specific purpose. A given SGML document instance may be linked to several applications, so you can generate different publications for the same data (for example, an introductory manual and a high-level reference book). SGML can incorporate virtually any type of data. The information can reside in a repository that will automatically provide updated data to any application that uses it. Files can be shared between publications and applications, easing data integrity and revision management.

Zandar's TagWrite Alchemy 4.0 can transform your SGML document into a



DynaText offers full hypertext capability and a robust browser, so you can navigate large on-line publications.



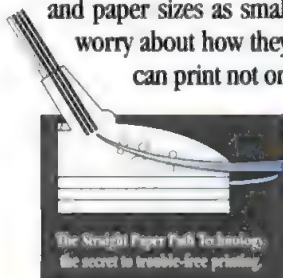
DynaTag lets you move data from word processing formats into a tagged version that can be brought into a DynaText document.

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CIRCLE 208 ON READER SERVICE CARD

Electronic Publishing

fully styled RTF—complete with graphics and formatted tables—for display, cut, paste, and output in your Windows word processor. Alchemy, a dynamic link library (DLL), can be used in any Windows application; you integrate an application into your word processor by calling the DLL. All work is done through the standard Word interface; the end-user never sees the SGML code. At press time, Zandar didn't include an SGML validation parser with its products, but it was planning to make one available.

Exoterica's OmniMark can perform similar tasks, but with more up-front work. Folio, a well-known player in electronic publishing, bundles OmniMark with a special Folio Views driver for SGML. You can also buy a Folio Views 3.1 SGML driver if you already have OmniMark. You need training, SGML expertise, and a copy of Folio's SGML Toolkit (\$2,995) if you want to author your own titles.

DynaText, EBT's SGML publishing engine, can directly accept SGML data and related graphics, then index the material into a hypertext format. It dynamically filters information based on SGML attributes, and then formats the presentation from a style sheet.

SoftQuad is marketing a new SGML browser named SoftQuad Explorer 1.0. Out of the browsers we examined, this was the easiest to use. It lets you create both traditional views (in chronological

order, for instance) and Webs. Webs let you link SGML data based on content, and can include references to information from more than one SGML document instance. Mosaic applications on the Internet are simple examples of Webs.

While SGML can support almost any type of external entity as part of a publication, you can't see video or hear audio tracks unless the delivery system supports it. Any application written to use SGML data must provide for outputting the type of data involved. When choosing a delivery system, carefully weigh your readers' requirements and the type of distribution you will use.

***DynaText, EBT's
SGML publishing
engine, can
dynamically filter
information based on
SGML attributes***

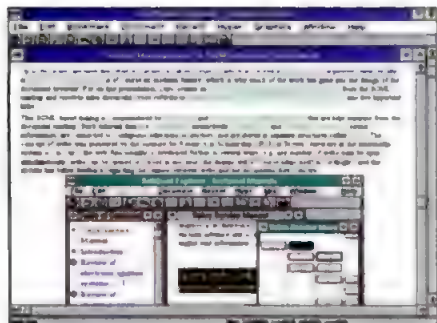
PLAIN PAPER STILL WORKS

If you have a publishing program that can accept SGML data, you can use information in your repository to produce traditional paper output. A simple solution for hard copy is to use one of the SGML authoring versions from Microsoft or Novell.

You can also export your publication file to an SGML-aware desktop publishing system. Corel has licensed Zandar's TagWrite to provide SGML import capabilities for its new version of Ventura Publisher. You must validate the document first, since TagWrite doesn't contain the SGML validation parser contained in Alchemy.

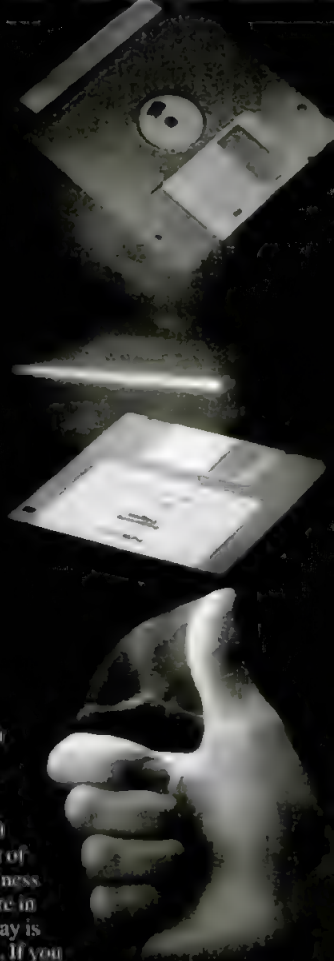
Frame Technology offers FrameBuilder, a special version of its FrameMaker publishing software that works with structured documents. The company offers a UNIX-based SGML toolkit that can create filters for SGML files, which you can then manipulate in FrameBuilder.

Interleaf plans to port Interleaf 6 to the Windows platform with some SGML capabilities early in the second quarter of 1995. The company's Interleaf 6 SGML, also due in early 1995, will have full SGML capabilities. This high-end tool is more suited to large-scale production by trained technicians, but does offer another avenue for firms working on adopting SGML. □



SoftQuad Explorer, excellent for working with hypertext SGML documents, includes tools for producing Web-style documents.

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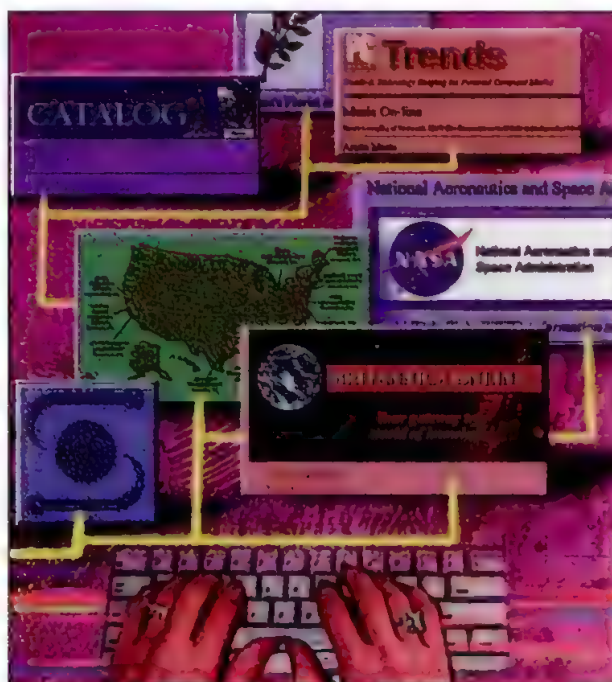
PC Computing, Dec. 1994, p. 140

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CIRCLE 124 ON READER SERVICE CARD

WEB BROWSERS

The Web Untangled



By Rick Ayre and Kevin Reichard

The World-Wide Web is the hottest source of instant information (and entertainment) on the Internet today. Web browsers are the software keys that unlock the door to that world of wonders.

The World-Wide Web is a playground of the mind, a place where anyone with the time and inclination can travel the globe, grabbing a portrait of the First Cat during a tour of the virtual White House, listening to digitized songs from cool, obscure bands, or skimming guides to cities and countries the world over. It's also a way for businesses—from newspapers and record houses to high-tech vendors like Microsoft and Sun—to reach out to customers. It doesn't exist in any physical sphere; indeed, the World-Wide Web is redefined every day by the people who use it.

One of the Web's many emerging identities is as the world's largest hypertext publishing enterprise, a vast panoply of interconnected pages and graphics. At its simplest, the act of publishing on the Web requires little more than a touch of formatting with HTML (hypertext markup language—see “HTML: Nothing but Net” for further details on publishing procedures). Consuming a publication is as simple as pointing your Web browser in the direction of the document; it does the rest.

Web browser? Yes. Sampling the wares of the Web requires a special software tool called a browser. NCSA Mosaic, the most famous browser of all (and 1994 winner of a *PC Magazine* Award for Technical Excellence), really launched the Web as a popular source of instant data—some practical,

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H I G H L I G H T S

Web Browsers

NCSA MOSAIC wins this year's Andy Warhol award for its blinding flash of fame. Within a few months, it has single-handedly put Web browsing, and the Web itself, on the map.

ALL-IN-ONE is the watchword of the new browsers. When we first examined Internet access tools (October 11, 1994), we looked to developers to provide an entire suite of tools. Now, packages such as Netscape include NewsNet and e-mail functionality.

MULTIPLE SESSIONS is another cutting-edge development. Products like Frontier Technologies Corp.'s WinTapestry and BookLink Technologies' InternetWorks (soon to be a part of America Online) let you initiate several sessions simultaneously. IBM Web Explorer even allows you to run multiple sessions of that program.

A PROFUSION OF PAGES is one result of NCSA Mosaic's success. In the BM (before Mosaic) era, Web pages numbered in the hundreds; in the AM (after

Mosaic) age, there are thousands, with new ones appearing daily. Almost anyone with access to an HTTP (hypertext transport protocol) server can be a worldwide electronic publisher.

BUSINESS BURSTS on the Internet/WWW scene with its own profusion of pages, and cybermalls are already lining the highways of the Web. But many vendors are waiting for security measures to be perfected before they launch whole hog into international electronic commerce.

some frivolous—and brought it to the masses. As a byproduct, it spurred development of thousands of "home pages" that can be read by anyone with full Internet access.

To find the aforementioned portrait of First Cat Socks, for example, you merely steer Mosaic (or any other browser) to the White House URL (uniform resource locator): <http://www.whitehouse.gov>. The network handles the task of connecting you directly to the computer that stores the various elements composing the White House home page. The browser then renders those elements—text, graphics, and possibly sound or video—and presents them as a "printed" document.

Browsing the Web is not only easy and fun, it's also forward-thinking, portending the future of personal computing: You work at your own computer, yet you mine data stored around the world. Furthermore, you do it with little effort and without having to know or care where or how the data is stored, what kind of computer it's stored on, or what kind of network that computer is connected to.

NERVES OF COPPER

The Internet, the physical foundation on which the World-Wide Web rests, is a supranational network of computers connected both by wires and by a common communication protocol, TCP/IP. It's a distributed network, so that it continues to function even if parts of it go down. It has evolved as a loose federation without central administration and, therefore, with no one person or organization in control.

Conceived at the CERN particle physics lab in Switzerland, the World-Wide Web was born of CERN scientists' desire to communicate more easily and efficiently with researchers in other locations. A proposal circulated in March 1989 articulated the goal of making all information accessible in a simple and consistent way and led, in November 1990, to a Web prototype that ran on a NeXT computer.

The first generation of Web servers, as you might expect, was populated mostly with information that physicists wanted to share. The second generation was populated primarily by technical research liter-

ature. Today, we're into a third generation of servers, populated with anything and everything under the sun.

GETTING THERE

The depth and breadth of Web content today is staggering. And one of the ways that the Web succeeds in making this content so accessible is through the full indexing and search capabilities that, with blessed foresight, were built into it from the beginning.

Suppose you're interested in the music of Liz Phair and want to see what Web resources are devoted to your favorite singer. Without signposts, the Web can be a daunting, amorphous maze; with a reliable guide like Carnegie-Mellon's Lycos home page (<http://lycos.cs.cmu.edu>)—which contains 216,000 unique indexed URLs—you can simply enter *Liz Phair* and *music* as search terms. Lycos then returns the existence of a Liz Phair home page (<http://txfsl.hfb.se/people/mlu/Music-Page/LizPhair/liz.phair.html>), complete with lyrics, pictures, a discography, and biographical information. Better yet, it contains links to other Liz Phair resources on the Internet. To get to any of these, you simply double-click the highlighted text. You don't have to remember URLs; the Web browser knows precisely where to go.

As a publishing venture, the Liz Phair home page is about as small-scale as you can get: It's the work of a single student (Magnus Lundquist, attending the Col-

Our Contributors: RICK AYRE is an executive editor and SARAH ROBERTS is a staff editor at *PC Magazine*. PADRAIC BOYLE is a frequent contributor to *PC Magazine*. JILL H. ELLSWORTH is the author of *The Internet Business Book* and *Marketing on the Internet: MultiMedia Strategies on the WWW*. SEAN GONZALEZ is a systems support programmer at Ziff Information Services. ANGELA GUNN is a freelance writer. KEVIN REICHARD has written ten books for MIS on the Unix operating system. TED STEVENSON was the associate editor in charge of this story, and AMARENDRA SINGH was the project leader.

lege of Borlange, Sweden) and is part of a larger collection of his varied interests (Calvin & Hobbes, The X-Files, Winona Ryder). For some examples of business-related Web publishing, see our sidebar "Businesses on a Virtual Rush to the Virtual Mall."

The Internet turns publishing economics upside down: Though the traditional publishing model involves considerable expenditure of capital when physically producing a document, creating a Web document is merely a matter of formatting text with an appropriate hypertext markup language (such as Easy HTML from the National Science Foundation), then placing the document on a Web server (one equipped with HTTP, the hypertext transport protocol). No printing or distribution costs are involved—just the cost of connecting the Web server to the Internet.

LOOKING AT BROWSERS

The first Web clients (readers) were text-mode line browsers, able to follow hyperlinks from one document to other, often remotely located, documents. As users added richer data types to their documents (images, sound, video), protocols were developed to handle the presentation of those types, and text browsers began to evolve into GUI multimedia tools.

NCSA's Mosaic was the first Windows-based Web browser—the killer app that started the stampede to the Web. Today, largely as a result of its stellar success, the browser field is in furious ferment, with new products released weekly and existing ones updated sometimes *hourly*. Browsers are even making it into operating-systems: IBM includes a browser with OS/2 Warp, Version 3, and Microsoft plans one for Windows 95.

To help you keep score in this brand-new ball game, our evaluation covers every Web browser that we felt was essentially complete when we conducted our tests. It includes six products that were officially shipping, three freeware packages not officially released by their developers but available for downloading, and one prerelease product that was not generally available to the public, but will be by the time you read this. The group



• Netscape Navigator

The world of Web browsers is in ferment—bubbling and seething with the energy of transformation. In fact, things are changing so fast that many products, including some world-class ones, are being held by their developers in a kind of indefi-

nite prerelease state—even while being made freely available to the public.

Our Editors' Choice, Netscape Navigator, is one such product: The package's developer, Netscape Communications Corp., has been giving it away free over the Internet since November 1994—but hasn't yet declared it officially "done." Done or not, we think it's the best Web browser you can get today.

Since many of Netscape's developers came from the team that created the original Mosaic at NCSA (practically the only browser in existence that actually has a history), comparisons to that program are perhaps inevitable. Netscape is more robust and markedly faster—it's optimized for dial-up connections and is able to display page elements before they're fully downloaded. It also has a much more usable inter-

face. Netscape is easy to configure yet retains some of Mosaic's valuable research-oriented features, such as the ability to annotate hotlists. When used in conjunction with Netscape's yet-to-be-released Web server products, the browser promises to gain secure transaction capability.

IBM's Web Explorer, another "prerelease" browser, is freely available to users of OS/2 Warp, Version 3, via download from the Internet. Web Explorer wins high marks for ease of setup and connects transparently to the Web. We give it an honorable mention. One up-and-coming browser worth looking out for is BookLink Technologies' InternetWorks, a "true" prerelease product (you *can't* actually get this one yet). I-Works promises to support OLE 2.0 and full e-mail capabilities and has an engaging tabbed-notebook interface.

includes NCSA Mosaic itself (now just a basic browser, but still free), the Mosaic licensees—primarily through Spyglass—that offer Spyglass's Enhanced NCSA Mosaic or further refinements of the Spyglass version, and a number of newer products developed from the ground up, like Netscape Communications Corp.'s Netscape Navigator.

Browsers are distributed in an interesting variety of ways, too. For example, both the freeware NCSA Mosaic and the commercial Netscape are given away for free over the Internet. Other browsers are components of full-featured Internet software bundles, such as WebSurfer with Netmanage's Chameleon. Then there are shareware browsers like Netcom's NetCruiser, Version 1.50: You can try one for free, but you must pay if you plan on using it for more than a week or so.

IN SEARCH OF GREATNESS

So what makes a great browser? First, the software should come with an easy-to-use, interactively customizable installation and setup routine. At a bare minimum, it should make it easy to mark your place and return quickly. It should facilitate viewing documents and files in various formats and should give you options for handling large multimedia objects like sound and video files. It should, of course, render graphical elements accurately, interpret HTML appropriately, and do all of the above as fast as possible. Finally, it should be extensible, so you can use *your* favorite software for viewing if you wish or snap in new software if it should emerge.

Does any current browser fill this extensive bill of particulars? Read the reviews that follow and find out.

Suitability to Task: Web Browsers

Web browsers are windows onto the Internet's emerging world of electronic publishing. Though all browsers display text and graphics and follow hypertext links, they do so with differing degrees of grace and thoroughness. Some are naturally easier to contend with than others.

In our **setup and connecting** task, we evaluate the sometimes complex process of getting a browser up and running. We look at how much help vendors supply in assembling and organizing the information necessary to make Internet connections; what, if any, resources they provide (such as their own home pages or other on-line aids) for getting connected; and how much configuration tweaking is required. We also delve into such questions as: What kinds of

connections does a package support? Is TCP/IP and Winsock connectivity supplied? If setup was *not* straightforward, how easy was it to reach the vendor for help, and how helpful were the support personnel when we got through to them?

SUITABILITY TO TASK

Product name	Power		Ease	
	Setup and connecting	Navigation	Extensibility	
	EXCELLENT	GOOD	FAIR	POOR

Our **navigation** task indicates how easy products are to use once you're actually on-line, addressing questions such as:

Does the package provide a home page (or other source) with some sort of "directory" of Web pages? (The absence of this useful feature is a definite minus.) How easy or hard is it to create and maintain

a list of your favorite pages or add and remove pages from such a list? When you're moving around the Internet, how far back does the package allow you to cache previous pages? How informative is the package about current status (such as the size of a download)? Is the screen clearly organized? Can you create custom lists of Web pages?

In evaluating products' **extensibility**, we take a glimpse at issues that go beyond the basics of Web browsing: What level of HTML compliance does a package provide? What features does it have that others do not? Will it let you fill out interactive documents? Does it have built-in text and graphics editors? Can it readily interface with third-party readers or editors? Can you print text from it? Graphics? Both? Does it allow you to view the underlying HTML document? Can it take on the functions of other Internet tools like newsreaders and mail packages?

SPRY Inc.

• AIR Mosaic

BY PADRAIC BOYLE

Surfing the World-Wide Web has never been easier, thanks to SPRY's AIR Mosaic, Version 1.1. Although its 16-bit architecture can slow things down, especially when grabbing large .GIFs, AIR Mosaic is a flexible, easy-to-use, easy-to-configure WWW front end. (A 32-bit version of AIR Mosaic is available but is not fully supported by SPRY.) This browser is available as a standalone over the Internet; you can download it via FTP (<ftp.spry.com/Air Mosaic Demo/AMOS DEMO.exe>) from SPRY to give it a trial run and then register it for \$29.95. AIR Mosaic is also included in SPRY's Internet In A Box, available in retail outlets for \$149.99, as well as in its popular AIR Series.

One of AIR Mosaic's strongest selling points is its ease of installation; you don't need to update any Windows drivers or add Win32s support. (This is important because of incompatibilities between Win32s and many systems.) But as with most of the browsers reviewed, AIR Mosaic requires a separate TCP/IP stack or PPP-compliant communications package with Winsock support. Fortunately, AIR Mosaic operates with all the popular TCP/IP and PPP packages on the market.

Once you are connected to the Internet, AIR Mosaic automatically retrieves SPRY's home page; from there you're introduced to the world of the Web. If an error occurs or you get lost, AIR Mosaic's context-sensitive on-line help gets you back on track.

FINDING YOUR WAY

AIR Mosaic is exceptionally easy to use and to customize. With the click of a button, you can add documents to a hotlist that can be quickly retrieved using a hotkey. A row of buttons at the top of the screen allows you to execute tasks without having to use the pull-down menus.

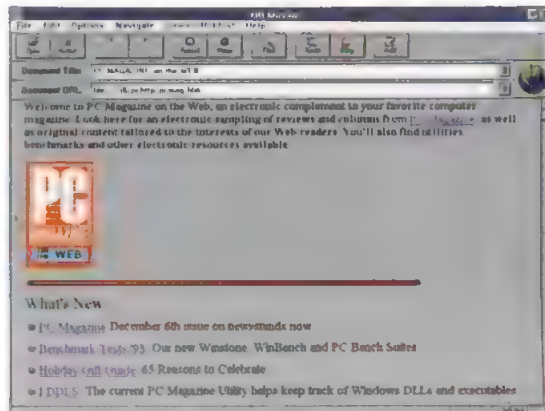
For a more manageable structure as you wend your way through the maze of resources, AIR Mosaic lets you categorize documents into folders, which can be added to the menu bar. You can create up to 15 hotlist folders, each of which can handle approximately 200 URLs.

A feature unique to AIR Mosaic is the Kiosk mode, which allows you to view the full screen without the obstruction of the menu. This is particularly handy if you wish to view a home page in its entirety, but the feature is somewhat limiting. You can only travel forward using hyperlinks in Kiosk mode, and you can't use the menu selections.

Also, you have to exit Kiosk mode to toggle between pages or navigate backwards.

HOW SLOW CAN YOU GO?

AIR Mosaic's sluggishness when loading large .GIFs can cause some anguish, especially if you're dialing in to a service and paying by the minute. You can turn off the graphics to save time, but then you'll lose the beauty of the more creative home pages. Some of the other



The rendering of Web pages is bold and clear in SPRY's AIR Mosaic. The Kiosk mode, which hides the menu and displays the full screen, lets you take advantage of this.

browsers handle this better. Netscape Navigator, for example, lets you navigate through a page while the .GIF is downloading.

As for other features: FTP and Gopher utilities, a graphics viewer, telnet, and 3270 emulation are all included in AIR

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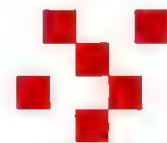


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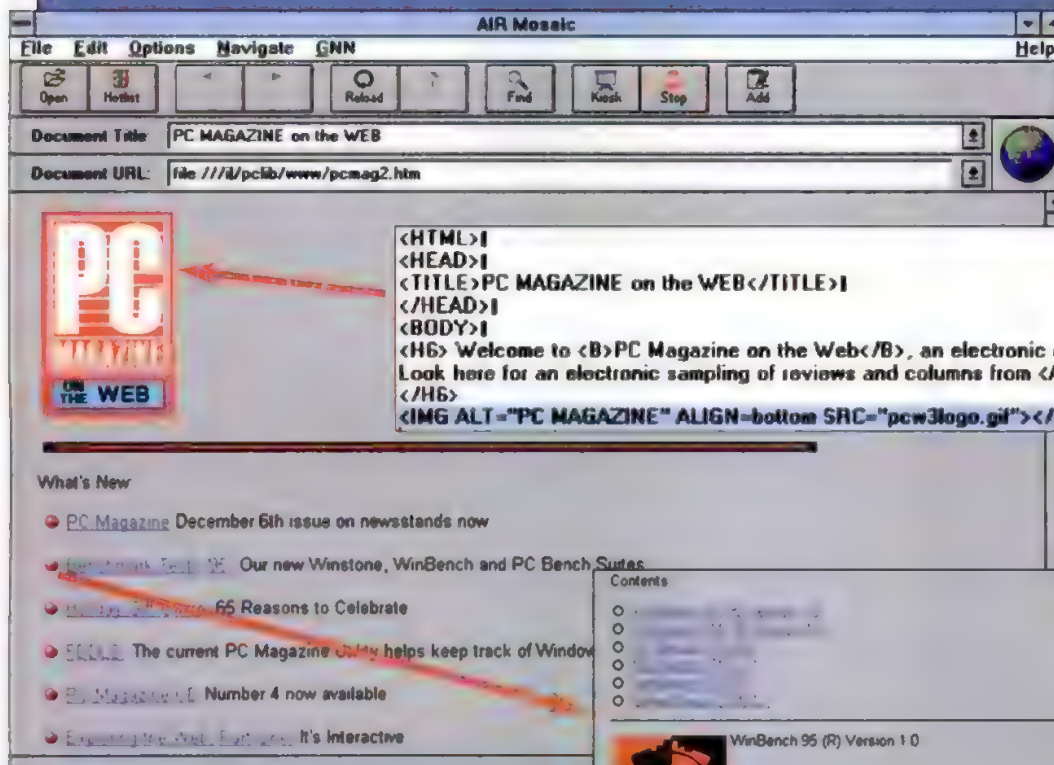
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Anatomy of a Web Page



This browser (AIR Mosaic) indicates hyperlinked elements in blue underlined text. To jump to a link, simply click the underlined text describing your destination; the browser then locates and displays that page. Links can be made freely to anything your browser can display that resides on any site (server) on the Web. These links are nonlinear and can interconnect in any conceivable way.

Contents

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WinBench 95 (R) Version 1.0

WinBench 95 is the latest version of Ziif-Davis' industry standard benchmark for gauging the graphics and disk performance of PCs under Windows. WINBENCH EXE is a self-extracting archive that contains the WinBench 95 files. Here's the [WinBench FAQ](#).

[readme.txt](#) contains license information, installation instructions and important notes about this version of WinBench (~32 kb)

[winbench.exe](#) a self-extracting archive containing WinBench 95 (~2 Mb)

Mosaic. The package also provides limited support for Usenet newsgroups and e-mail. Both Internet In A Box and AIR Series provide full newsgroup and e-mail capabilities.

If time is not of the essence and you need a good, utilitarian Web browser,

SUITABILITY TO TASK

	AIR Mosaic	
	Power	Esse
Setup and connecting		
Navigation	GOOD	FAIR
Extensibility	FAIR	GOOD

AIR Mosaic is an excellent choice. Although a bit sluggish, AIR Mosaic is easy to use and configure, and its utilities more than make up the difference.

► **AIR Mosaic, Version 1.1.** SPRY Inc., Seattle WA; 800-777-9638, ext. 26; 206-447-0300; fax, 206-447-9008; e-mail, info26@spry.com.

Circle 452 on reader service card

Cornell Law School Legal Information Institute

Cello

BY KEVIN REICHARD

When compared with other freeware Web browsers—such as the original NCSA Mosaic—Cello 1.01a is a worthy competitor. But as a rival to the slick new commercial browsers like BookLink's Internet Works, Cello (developed at Cornell Law School's Legal Information Institute) comes up just a bit short.

Apart from its features, Cello's primary appeal to Web aficionados is the speed with which it processes HTML documents (even those jammed with graphics). Although all Web browsers are somewhat dependent on the underlying networking scheme for their perceived speed, Cello works well even over a 14.4-Kbps modem connection. Cello requires that you have a SLIP or PPP connection via Winsock or a direct TCP/IP connection. The package is available over the Internet via FTP from <ftp://pub.lti/cello/cello.zip>

STRING MUSIC

Cello's integrated capabilities make it the only software you'll need for most of your Web browsing tasks. It can follow hyper-

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■ Late, but Not Forgotten

By Sarah Roberts and
Amarendra Singh

The phrase *explosive growth* is used a lot in the PC industry, but perhaps never more appropriately than for the current Web-browser market. In one startling example, 1.25 million America Online subscribers will soon have access to the World-Wide Web through InternetWorks—a product so new it hadn't even shipped when AOL purchased it last November. I-Works was one of three products that didn't reach us in time for full review, but it should be available in final form by the time you get this issue. We were able to take a good look at all three packages. Here's our report.

WORKING IT

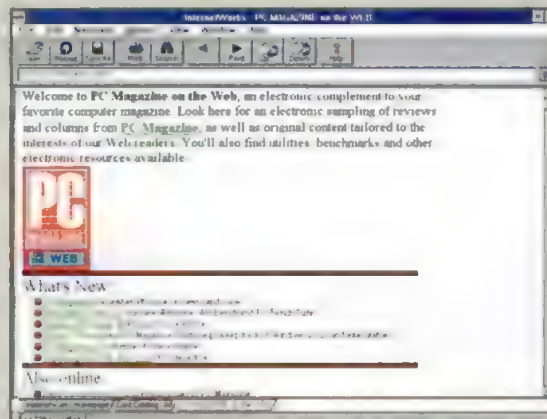
InternetWorks (developed by BookLink Technologies) doesn't come with its own TCP/IP stack, but it is Winsock 1.1-compliant. This means it will work with any TCP/IP package, through either a direct or a modem-based connection.

Like many other browsers, I-Works introduces you to the Web through its own home page; it then offers a variety of ways to navigate the Internet. The most innovative of these is by clicking the notebook-style divider "tabs" that the package provides for each Web page. Another cool I-Works navigation feature is the card catalog, which lets you create what are essentially hotlists. The advantage here is that InternetWorks supports multiple card catalogs, so you can sort your favorite Web sites in multiple dimensions.

Still other features set this package apart from the current crop of browsers: I-Works offers true multithreading so you can send an e-mail message, download a file, and visit your favorite home page—all at the same time. Another key feature is I-

Works' OLE 2.0 support; presently, InterAp from California Software has the only browser to offer OLE functionality. I-Works also has newsgroups, file saving, and printing.

BookLink is offering another version of I-Works: InternetWorks Lite is available for free at <ftp://ftp.>



BookLink Technologies' InternetWorks has a friendly interface: The clear toolbar, tabs, and rendering make it easy to get around and remember where you've been.

booklink.com/lite, but it has only limited multithreading capabilities and doesn't offer OLE 2.0 support or e-mail. The full version of I-Works is scheduled to sell for \$129 and will include the Internet Yellow Pages.

A ROSE BY ANY OTHER NAME

One of the first companies to license Enhanced NCSA Mosaic from Spyglass was FTP Software, best known for its TCP/IP package (included in its Internet tool set, Explore OnNet). FTP's version of Mosaic naturally has much the same functionality as the Spyglass version we review in this roundup, but FTP has made some welcome improvements to the basic package.

Explore OnNet Mosaic offers the basics—support for multiple windows, printing, forms, proxy gateway, the ability to create hotlists, and more. Perhaps the most exciting addition is that (as with Netscape Navigator) you can read and view your files as they are

downloading instead of having to wait. Explore OnNet is designed for a modem-based connection but works with most TCP/IP stacks and PPP- and Winsock 1.1-compliant packages.

One area that still needs work is Web navigation. Explore OnNet Mosaic has only two simple navigation icons—one to move forward and one to move backward. You have to use the menu bar or hotkeys to access all commands, which can be irritating. Also, you can't modify the .INI file to customize your menu bar, which you can do in the original NCSA Mosaic. Overall, Explore OnNet has made a decent showing and is currently available for \$149.

SURFING SAFARI

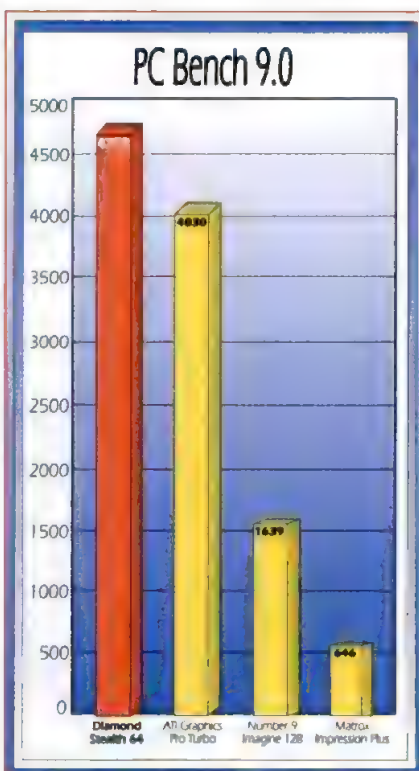
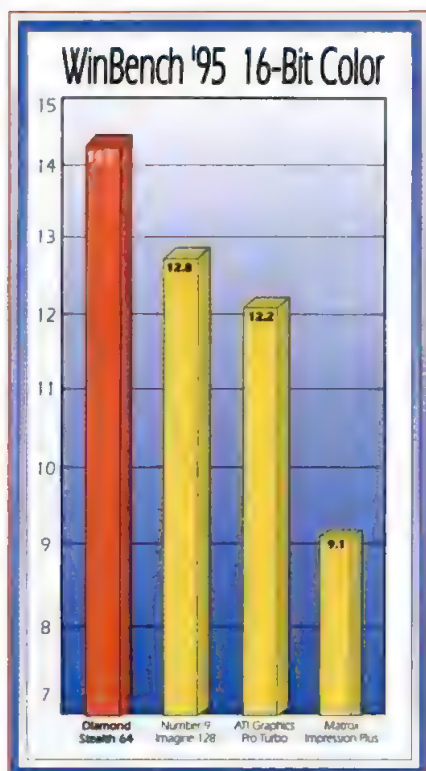
The last latecomer was Netmanage's WebSurfer (a component of Chameleon). This package may have the easiest configuration and installation process yet. All you have to do is click on the "Instant Internet" icon and voilà—your software is configured for an Internet connection, ready for you to sign up for an Internet account through any one of several on-line services.

Netmanage's home page is the first place you'll go. Like IBM Web Explorer, WebSurfer includes some features seasoned Web veterans will appreciate, like support for simultaneous connections and the ability to import your old Mosaic .INI file so you can automatically retain all your favorite sites. In addition, WebSurfer keeps a "history" page that allows quick connections to previously visited sites, lets you create hotlists of your favorite locations, and supports printing.

To get WebSurfer, you must either buy Chameleon, which retails for \$199, or download just the Web browser at <ftp.netmanage.com>. □

NO CONTEST.

"The Diamond Stealth 64 VRAM is the leader in performance and usability. It blazed through our tests, recording the best times... Its InControl Tools lets you master your environment in every respect; icons make it simple to control power management, establish multiple views, and zoom in on targeted information." —John Gartner, Technical Editor, Serdar Yegulalp, Assistant Technical Editor, James Miller, Laboratory Assistant, "Windows Magazine Recommended", *Windows Magazine*, December 1994



Windows 3.1 PCI performance tests performed by Diamond Multimedia Systems, Inc. on publicly available hardware and software running Ziff-Davis' WinBench 95 Version 1.0 on an HP Vectra XU 5/90 Pentium 90MHz system with 256k cache, 40MB RAM, 540MB SCSI hard disk, SmartDrive 2048 128, and DOS 6.2. All Cards were tested at 1024x768x65k 72Hz Large Font. The Stealth 64 VRAM was configured with 2MB of VRAM using driver release 1.20. The ATI Graphics Pro Turbo was configured with 2MB VRAM using driver release v1.03. The #9 Imagine 128 card was configured with 4MB VRAM using driver release v1.29. The Matrox Impression Plus was configured with 2MB VRAM using driver release 1.42.

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December, 1994



November, 1994



September, 1994

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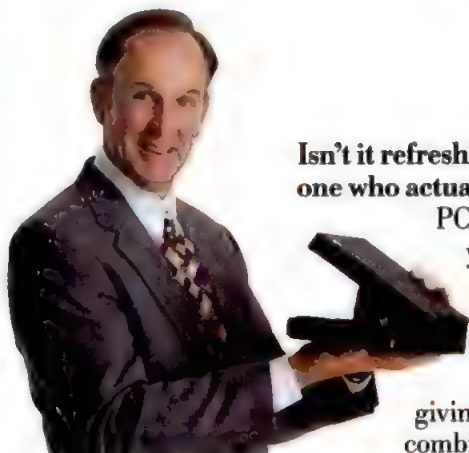
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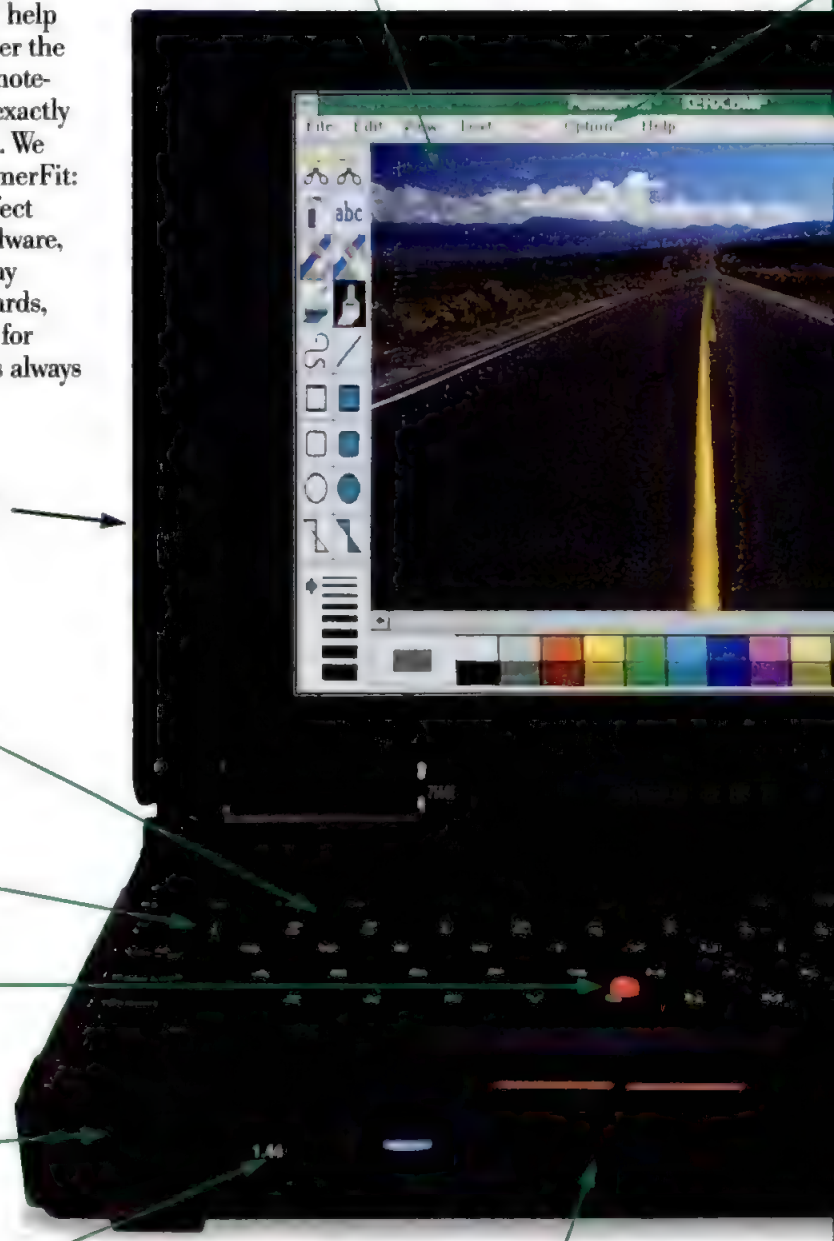
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text links to newsgroups, send (but not retrieve) electronic mail, and perform a search on a WAIS gateway—as long as you provide IP addresses for these func-

phrase, separating it awkwardly from the rest of the text. Another quirk: Cello doesn't automatically resize Web pages when you resize a window, so you must reload the document to display the appropriate layouts.

Some of these bumps can be smoothed out manually. For instance, Cello's hypertext link default can be changed through an easily accessible menu choice that replaces the dotted lines with underlining. Furthermore, every text element can be adjusted by font, size, and color. Still, the general perception is that Cello-rendered Web pages are on the rough side—especially when compared with NCSA Mosaic or Netscape Navigator. This issue of faithful rendering will only become more impor-

tant as the Web's popularity as an electronic publishing platform increases.

Sad to say, a product finalized in March 1994 is already showing its age. But this is the unfortunate reality of the competitive world of Web browsers. By the time you read this, Version 2 of Cello should be available, at least in beta form. Developer Thomas R. Bruce promises that this total rewrite will address many of the concerns raised here (such as better control over in-line images) and add support for forms, a button bar, and Object Linking and Embedding (OLE).

► **Cello, Version 1.01a.** Cornell Law School Legal Information Institute, *Ithaca, NY*; e-mail, lii@fatty.law.cornell.edu. Circle 453 on reader service card

Spyglass Inc.

Enhanced NCSA Mosaic for Windows

BY PADRAIC BOYLE

Spyglass holds a big card—the official licensing agreement for commercial rights to the NCSA Mosaic graphical interface—and recently played it by unveiling Enhanced NCSA Mosaic for Windows (now in Version 1.02).

When Spyglass acquired the rights to Mosaic, it decided essentially to start over by streamlining and stabilizing the code and eliminating some features such as the

hotlist and some task buttons. Several of these features will begin reappearing in the next release. Meanwhile, in Version 1.02, Spyglass has improved the original Mosaic by including printing, support for forms and multiple windows, a proxy gateway, and a newsreader (albeit a very limited one).

You can get Spyglass's Enhanced NCSA Mosaic by buying *The Mosaic Handbook for Microsoft Windows* (\$29.95), published by O'Reilly and Associates. But the package is primarily shipped from OEMs to companies that then customize the package and ship their own integrated release.

Installing Spyglass's Enhanced NCSA Mosaic is pretty straightforward. Windows drivers are automatically installed and configured for Win32s operations; however, Win32s may cause problems in systems with high-end graphics cards or with less than 4MB of RAM. The package does not come with either a TCP/IP stack or an asynchronous package, but it does work with most TCP/IP stacks or PPP-compliant packages that support WIN-SOCK.DLL.

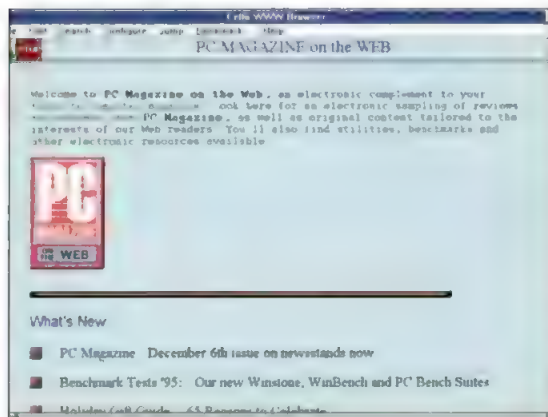
To configure Enhanced NCSA Mosaic you have to make selections in the Preferences dialog box or manually edit the .INI file, which can be cumbersome. (This is in contrast to SPRY's AIR Mosaic, for example, which handles configuration via pull-down menus.) Version 2.0 of Enhanced NCSA Mosaic, due out by the time you read this, should include a friendlier configuration menu.

FOR WHOM THE DECK IS STACKED

Once you're connected, your first glimpse of the Web is through Spyglass's home page, which is stored on your local PC—not Spyglass's server. From there you can hyperlink to the Web.

One of Enhanced NCSA Mosaic's most useful features is support for multiple windows. This allows you to connect to multiple hosts and switch between windows to view data. Navigating Enhanced NCSA Mosaic is similar to navigating most of its competitors, except that it has few of the one-click navigation aids provided by other packages (only backward and forward arrows are available).

Other minor inconveniences: When you retrieve a document or .GIF, the



Cello's navigational tools are limited (you can jump forward or stop a download only from the toolbar), and its graphical page-rendering is cruder than that of some other browsers.

tions. Cello also launches telnet, 3270, and FTP sessions independently.

The main tradeoff for Cello's power is its less-than-graceful handling of in-line graphics (graphic images in HTML documents) and document layouts. When you view a Web document, everything but the document text (bars, boxes, images, and so on) is a graphic. Something as simple as the edges on a two-tone bar or a drop shadow must be rendered by the browser, and here Cello falls short, treating such graphical elements rather crudely. Two-tone bars, for example, appear uneven at the ends; drop shadows are rendered with thick, ungainly lines.

OVER FAITHFUL

In addition, Cello interprets HTML too literally in rendering the spaces around

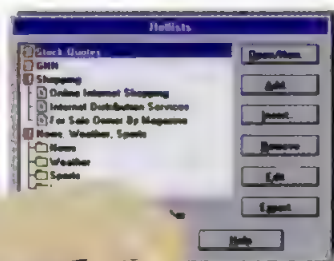
SUITABILITY TO TASK		
	Cello	
	Power	Ease
Setup and connecting	Good	Good
Navigation	Good	Good
Extensibility	Good	Good

HTML tags, which makes word spacings uneven and gives the document a choppy, amateurish look. Cello also has an unusual default method of indicating hypertext links. Instead of relying on a contrasting color or underlining (or both), it puts a dotted line around the linked word or

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CIRCLE 028 ON READER SERVICE CARD

► SUMMARY OF FEATURES

Web Browsers



Products listed in alphabetical order

■ = YES □ = NO

	AIR Mosaic 1.1	Cello 1.01a	Enhanced NCSA Mosaic for Windows 1.02	InterAp 26	NCSA Mosaic 2.0	NetCruiser 1.50	Netscape Navigator
List price	\$29.95 (also included in other SPRY products)	Free	Varies by vendor	\$295.00	Free	Included with Netcom's Internet service	Free (\$99.00 per user for corporate package)
General Features							
Allows multiple simultaneous connections	■	■	□	□	■	□	■
Requires third-party SLIP/PPP provider	■	■	■	■	■	□	■
Winsock 1.1-compatible	■	■	■	■	■	□	■
Configuration							
Editable INI file	■	■	■	■	■	■	■
User can turn off graphics	■	■	■	■	■	■	■
Navigation and Storage							
Can save documents to disk	■	■	■	■	■	■	■
Can print text and graphics	■	■	■	■	■	■	□
Displays progress report while loading pages	■	■	■	■	■	■	■
Offers interactive hotlist	■	■	■	■	■	■	■
Can add current URL to hotlist	■	■	■	■	■	■	□
History and Customization							
History log	■	■	■	■	■	■	■
Unlimited page cache	□	■	□	□	□	■	■
Customizable page cache	■	■	■ (via INI file)	■	■	□	■
User can create and edit stylesheets	□	□	■ ①	■	□	■	□
Macro support	□	□	□	□	■	■	□
OLE 2.0 support	□	□	□	■	□	□	□
Forms support	■	□	■	■	■	■	■
Tools							
archie	□	■	□	□	□	□	□
FTP	■	■	■	■	■	■	■
Gopher	■	■	■	■	■	■	■
Jughead	□	■	□	□	□	□	□
Veronica	□	□	□	■	□	□	□
WAIS	□	■	□	□	□	□	□
Miscellaneous							
Usenet newsgroups	■	■	■	Optional	■ (read only)	■	■
E-mail	■	■	□	Optional	□	■	■ (send only)
MIME support	■	□	N/A ②	Optional	N/A ②	□	■
Search capabilities	■	■	■	■	■	■	□
Local on-line help	■	■	■	■	□	■	□
Printed documentation	■	□	■	■	■	■	■ (corporate package, optional for free version)
Debugging	■	■	■	■	■	□	■

N/A ① Not applicable. The product is a native OS-2 application.

N/A ② Not applicable. The product does not have this feature.

① Only fonts are editable via INI file.

status bar at the bottom of the screen shows the source path and name but offers no information about the size of the file or the progress of downloads. Furthermore, the package includes no graphics viewer, although it supports third-party viewers.

Another of Enhanced NCSA Mosaic's strong points: If you're in the middle of retrieving a document and the transmission is taking too long, you can abort the task by hitting the Esc key. Multiple windows support is still its biggest plus. Enhanced NCSA Mosaic is not as feature-rich as

other products on the market, such as AIR Mosaic, but it does provide a no-frills stepping-stone to the wonders of the Web.

► **Enhanced NCSA Mosaic for Windows, Version 1.02.** Spyglass Inc., Naperville, IL;

708-505-1010; fax, 708-505-4944; e-mail, info@spglass.com.

Circle 454 on reader service card

PC VISTA California Software Inc.

• InterAp

BY PADRAIC BOYLE

If California Software comes through with all the goodies promised for InterAp, its Internet access package, this product should be a real presence in the rapidly evolving scene. And at press time, California Software seemed pretty

SUITABILITY TO TASK

	Power	Esse
Enhanced NCSA Mosaic for Windows		
Setup and connecting	GOOD	GOOD
Navigation	FAIR	GOOD
Extensibility	FAIR	GOOD

FEBRUARY 7, 1995 PC MAGAZINE 189

Businesses on a Virtual Rush to the Virtual Mall

By Jill H. Ellsworth

The hottest thing going on the Internet these days is the World-Wide Web. And the hottest development on the Web is...business. The use of the Web for commercial home pages, cybermalls, and virtual storefronts has recently outstripped Gopher use as the most popular Internet activity.

Companies as diverse as Dun & Bradstreet, Mighty Dog T-Shirts, Rolls Royce of Beverly Hills, Roswell's Bookstore, and Scottso the Clown are all creating a business presence on the Internet. Their Web home pages are typically designed to attract customers with flashy text and graphics (like the frequently updated pictures of Iguana Images' mascot, Dupree, at <http://iguana.images.com/>). They also provide point-and-click access to information, entertainment, and direct on-line sales.

This fire is being fueled by the rise of easy-to-use graphical browsers such as Cello, Mosaic, and Netscape Navigator and graphical Internet front ends like those provided by Chameleon, Netcom, and Pipeline. These nifty new tools are attracting new users to the Internet by the tens of thousands.

IT TAKES ALL KINDS

The range in size and types of businesses using the Web is enormous. Small businesses and sole proprietors operating on a shoestring—florists, physicians, craftspeople, realtors, and the like—are there alongside big companies like Motorola, Sun Microsystems, and Time.

One tremendous advantage of the Web as a venue for small businesses is that it can level the playing field, letting a cottage industry in the hills of Pennsylvania compete on a more or less equal footing with a corporate giant headquartered in Manhattan. The cost of Internet access is so low that even small businesses can afford

to be there—preparing their own Web pages or using the services of an increasing number of Web consultants.

HAPPENINGS ON THE EDGE

Businesses using the Web are conducting many traditional activities on-line: communication, customer support, and, increasingly, marketing and sales.

Hewlett-Packard, for example, offers a customer support site at <http://support.mayfields.hp.com>. Customers can access software patches, cruise for solutions to technical prob-

lems, get announcements and news, and offer feedback.

you visit The Branch Mall's home page (<http://branch.com:1080/>), you can click on the voice link to hear a welcome message, then click on hotlinks to any of the storefronts.

Nova Scotia Technical Network provides a cybermall for commercial products and services called CyberAds (<http://www.nstn.ca/cybermall/first.html>), which has an Internet Business Directory, a Cybrary, and public information Kiosks.

BEYOND THE BLUE HORIZON

The future of commerce on the Web will likely turn on one key item: security. Many groups are hard at work creating secure transaction methodologies—dubbed cyberbucks, digi-cash, net-cash, and the like—that will effectively support on-line monetary transactions through such devices as encrypted signatures and authentication algorithms. Once in place, such security measures should make buying and selling in cyberspace popular.

One offshoot of the burgeoning business activity on the Web is an ancillary industry of Web service providers that offer home

page preparation, Web space rental, and various consulting services. The Tenagra Corporation is one of the most interesting. A part of the NASA commercialization center, Tenagra orchestrated the creation of the Racquet Workshop—the first tennis pro shop on the Web—by doing a competitive market assessment, defining page content, processing the images, and setting up the Web site (<http://arganet.tenagra.com/Tenagra/tenagra.html>).

With Internet connectivity offered virtually for free by Microsoft Windows 95 and OS/2 Warp, with the Internet growing by about 10 percent a month, and with Web activities doubling every three months, the future of business on the Web looks bullish. □



Ordering fresh flowers is just one of the things you can do on the Web. You can get to Flowerstop, Your Online Fresh Flower Market, from The Branch Mall's home page.

lems, get announcements and news, and offer feedback.

EINet, by contrast, provides commercial Web services and multimedia products such as MacWeb, WinWeb, MacWAIS, and WinWAIS in support of commerce and security on the Internet. In an effort to give back to the Internet, they support a directory of resources (<http://galaxy.einet.net/>).

Companies can set up their own Web servers as virtual storefronts or lease "space" in a cybermall from a Web services provider. One of this new breed, The Branch Mall, has electronic stores for all kinds of vendors.

These currently include booksellers, chocolatiers, a logging and timber company, and vendors of flags, exercise devices, and tuxedos. When

National Center for Supercomputing
Applications, University of Illinois

• NCSA Mosaic

BY SEAN GONZALEZ

If you have direct or dial-up TCP/IP Internet access and don't have NCSA Mosaic, Version 2.0, wait no longer to down-



The now-famous globe logo spins in the upper-right-hand corner of the screen as NCSA Mosaic accesses Web pages. Interrupting the process is as simple as clicking on the icon.

load this World-Wide Web browser (ftp.ncsa.uiuc.edu). Mosaic 2.0, younger sibling of the browser that started it all, is available free of charge (though not yet officially released) over the Internet for noncommercial purposes. (Licensing for commercial use is possible through Spyglass, whose Mosaic product is also reviewed here.)

Mosaic 2.0 is a 32-bit application for Microsoft Windows 3.1, Windows for Workgroups, Windows NT, and OS/2. But unless you run Windows NT, you'll need your vendor's 32-bit extensions for Windows (Microsoft's 32-bit extensions for Windows—Win32s, Version 1.1.5a—are in the same directory as Mosaic 2.0). For those who can't run 32-bit applications, two old, unsupported 16-bit versions (Version 1.0 and Version 2.0 Alpha 2) are still available from NCSA.

Thanks to a great installation guide and FAQ document, installing Mosaic 2.0 is a snap. If you need more information, you can order it via the Mosaic support line or by e-mail (orders@ncsa.uiuc.edu).

Mosaic 2.0 will run as-is from the distribution package, but you may want to make some changes to MOSAIC.INI, such as adding your e-mail address and defining

your SMTP and NNTP servers for Usenet News. If your system has sufficient RAM, increasing the setting for the number of automatically cached documents will speed access to recently viewed pages.

TOOL TIME

When you run Mosaic 2.0, the first thing you'll see is NCSA's home page, which includes links to Mosaic 2.0's on-line documentation and Web-server directories. The documentation contains such useful information as how to configure any necessary viewers. (NCSA's upcoming GUI configuration tool should make this a lot simpler.)

Mosaic 2.0 includes a couple of useful feedback tools: Tool Tips identifies each toolbar button's function, and the status bar displays URLs as you move the cursor over them and informs you of a page's download size and progress.

Mosaic 2.0 also provides

three tools for managing URLs. You can annotate pages you've visited; each annotation is then displayed as a URL at the bottom of the page the next time you

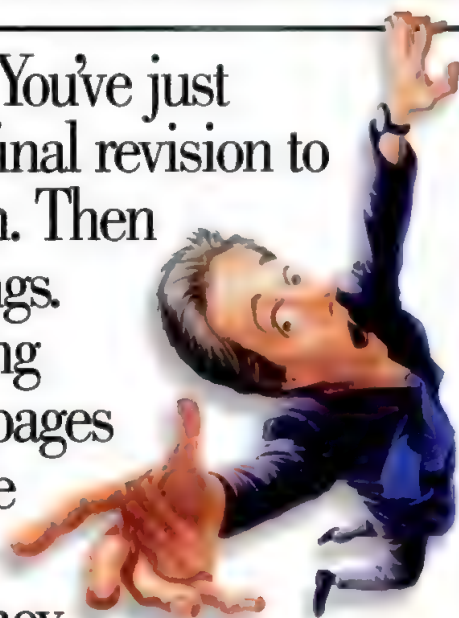
SUITABILITY TO TASK		
	NCSA Mosaic	
	Power	Ease
Setup and connecting	++	++
Navigation	++	++
Extensibility	++	++

open it. You can create a hotlist of URLs—a good way to store those you access infrequently. And you can build cascaded menus of URLs using the Menu Editor. Both the hotlist and the Menu Editor let you open URLs from pull-down menus.

SEMISTANDARD BEARER

Although HTML standards are still being defined, Mosaic 2.0 is almost fully HTML, Version 2-compliant. This means you can use most Internet resources, including forms, FTP, Gopher, newsgroups, telnet, and WAIS. Newsgroup support is limited

It's 3:50 pm. You've just finished the final revision to the sales plan. Then the phone rings. "We're sending over 10 new pages of competitive info." Click. Good thing they lock the windows on this floor. You have to get it into the plan by the end of the day. What now?



to read-only, however; no tools to manage subscriptions to newsgroups are available. Mosaic 2.0 does not support MAILTO URLs (which allow you to send e-mail directly from the browser), but NCSA plans to implement this feature soon.

Mosaic 2.0 lets you view or save the HTML source of a page. You can also print the formatted page or even use a Print Preview feature, but these tools are still unreliable. NCSA hopes they'll be bug-free by the official Version 2.0 release.

Site administrators should be pleased with Mosaic 2.0's advanced features. Kiosk Mosaic disables configuration-editing options to prevent unauthorized changes. Mosaic 2.0 also supports proxy gateways, and, in a joint effort with Spyglass, NCSA plans to add data encryption and authentication and digital signature support.

Aside from a few quirks and bugs, Mosaic 2.0 is a stellar Web browser. Having paved the way for others, it remains at the leading edge of this new and exciting technology.

► **NCSA Mosaic, Version 2.0.** National Center for Supercomputing Applications, University of Illinois, *Champaign, IL*; 217-244-3473; e-mail, orders@ncsa.uiuc.edu. Circle 456 on reader service card

Netcom On-Line Communication Services Inc.

NetCruiser

BY KEVIN REICHARD

Using Netcom On-Line Communication Services' NetCruiser, Version 1.50, means taking the bad with the good. Although there's much to like about NetCruiser and its Web browser, there's also much that may fail to please.

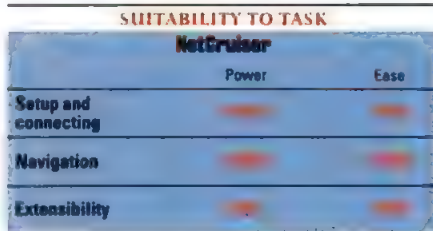
Part of NetCruiser's appeal is that it comes free with subscriber service to Netcom's Internet access service, which is \$19.95 a month with a \$25 startup fee. (Note that the software works *only* with this service.) NetCruiser offers a variety of Internet tools, including a separate Web browser. Connecting to the Internet in this manner is absolutely painless; NetCruiser handles all of the messy network-connection details.

The other side of the access equation, however, is that using Netcom's service limits you to the proprietary NetCruiser

tools. So if you like NetCruiser's Web browser, you're sitting pretty; if you dislike it, this could be a problem.

ONE STEP OVER THE LINE

Chances are you will like the NetCruiser browser, as it affords easy access to World-Wide Web servers. A well-designed toolbar lets you navigate through previously chosen Web sites as well as add sites to a list of bookmarks. In



a move that 14.4-Kbps modem users will love, the NetCruiser browser provides full information about the status of a page download, telling you how much of the page has been grabbed and how much is to come—including graphics files. Anyone who's sat through the interminable download of a massive .GIF—or of a .GIF-studded page—will appreciate this level of feedback.

NetCruiser and the Web browser seem clearly intended for Internet novices; unfortunately, the browser is configured with a minimum of interesting Web sites. Users are also expected to know a Web site's URL or its physical location. The only linked searching tool is the CERN Web-server listings, which tends to be more difficult to use than indexes such as Carnegie-Mellon's Lycos. Netcom also provides its own home page and linked pages for NetCruiser users; though these are useful, they could be expanded to provide a larger view of the vast WWW.

The NetCruiser browser's performance was regrettably inconsistent. Out of 19 test connections, the browser failed to connect to a Web server 5 times. Twice it connected but then choked on the resulting home page, returning an error message. Additionally, we experienced two general system failures that may have been due to the network connection.

Part of the problem lies in the frequent NetCruiser upgrades released during the evaluation period (indeed, it sometimes seemed like upgrade *du jour*). It's clear that the code hasn't achieved an acceptable level of stability, as evidenced by the system crashes and errors. The flip side, of course, is that Netcom seems committed to bringing out new versions of NetCruiser as needed.

In the end, NetCruiser is an adequate tool for novices who want relatively painless exposure to the Internet and are willing to contend with some stability issues. More sophisticated Internet users who need a reliable, robust Web browser may find their needs better served elsewhere.

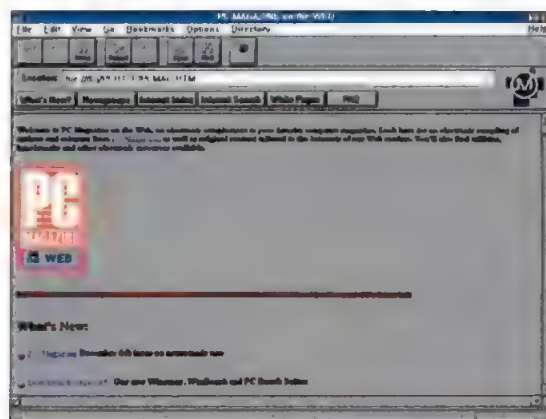
► **NetCruiser, Version 1.50.** Netcom On-Line Communication Services Inc., *San Jose, CA*; 800-501-8649, 408-983-5970; fax, 408-241-9145; e-mail, info@netcom.com. Circle 457 on reader service card

A Netscape Communications Corp.

EDITORS' CHOICE Netscape Navigator

BY ANGELA GUNN

With all the media hype surrounding NCSA Mosaic, the question on everyone's mind is: Can the Web move beyond this alleged "killer app"? Judging from



Single-button access to newsgroups, choice Web pages, powerful search engines, and clear, crisp graphical images are part of what makes Netscape Navigator stand out.

the early release of Netscape Navigator we downloaded in November, the answer seems to be yes. This sparkling new free-ware browser from Netscape Communications Corp. is still under construction but is available via FTP from <ftp.mcom.com/netscape/>. The designers of

Netscape were on the original NCSA Mosaic team, and from the looks of things, they've learned from that pioneer product's triumphs and shortcomings. Netscape is designed with a finer understanding of what people want from the Web—faster graphics and fewer configuration hassles.

Installation is simple: Download the file, unzip it, move the NETSCAPE.INI file to the Windows directory (if you've never used any other version of Mosaic before), and manually add the icon to a program group. Be warned that crucial configuration information isn't available in the beta .ZIP file; Version 1.0, however, will have the info. You have to connect to the *home.mcom.com* site to find out which TCP/IP stacks have been tested with the browser—an annoying catch-22. (At press time, the freeware product Trumpet, Chameleon's NetManage, FTP Software's PCTCP, Microsoft Windows for Workgroups, and Microsoft NT had all been tested.)

PUMPED, PRIMED, AND READY

Once the package is loaded and linking, you may never want to log off again. Netscape positively crackles compared with older browsers. Part of the speed may be attributable to psychology; Netscape keeps you so well informed about your transfer status (by byte count and status thermometer) that no time is spent fretting over it. This perception is enhanced by the "fade-in" effect: When Netscape links to a server using Netscape Communications' server software, you can view graphics before they've entirely arrived. Saving to disk and printing work as expected; however, a few of the more advanced Web pages, particularly those with forms, proved troublesome to access. (It's unclear whether the fault lay with Netscape or the server.)

To retrieve help information, you have to go on-line, but help and certain other pages linked to Netscape Communications' home page are well-chosen and are echoed on the main screen by a set of interface buttons. Netscape doesn't allow you to import old lists from NCSA Mosaic,

but that's not a problem; designing a new hotlist is a treat. The program keeps track of the pages, when they were created, and any notes you care to make about them (a welcome throwback to the old Annotate function in NCSA Mosaic). You can also arrange pages into submenus and used the search engine to page through the list if it gets too long.

LEAVING YOUR MARK

Two of Netscape's navigation aids can truly enhance your travels. First, you can keep track of your links for days, weeks, or even a year after you've first used them. Second, the history list (which is configurable to take up as much memory as you wish) makes it easy to generate bookmark items you've already seen without actually having to be in the page.

Netscape also graciously forgives bad habits. For example, if you start loading

an image type you don't have a viewer for, Netscape reminds you that an application hasn't been chosen and asks if you want to try anyway, abort, or save to disk. And scrolling down mid-transfer doesn't faze the software; pages continue loading without incident. This is a real boon if you're impatient when grabbing graphics-heavy pages.

That Netscape was built to work with proprietary server software called Netsite doesn't really seem to matter. (Netscape Communications is giving away the browser to encourage sales of its server software to Web sites.) It's still a star, even as a solo act. The lack of configuration files may intimidate the novice user, but even slightly experienced Internet surfers should download Netscape and check out the future of World-Wide Web browsers. What the heck—it's free.

► **Netscape Navigator.** Netscape Communications Corp., Mountain View, CA; 800-638-7483, 415-254-1900; fax, 415-254-2601; e-mail, info@mcom.com.

Circle 458 on reader service card

SUITABILITY TO TASK		
Netscape Navigator		
	Power	Ease
Setup and connecting		
Navigation		
Extensibility		



187 pages of legal briefs have just arrived at the office. On your desk. Apparently, your boss wants you to key them into his new client report. By 5:00 pm. For a moment, you wonder if life in prison without parole would be so bad after all. What now?

IBM Corp.

• Web Explorer

BY AMARENDRA SINGH

A few of the packages in this roundup require you to change your TCP/IP stack, but IBM's Web Explorer is the only one that asks you to change your operating system. Web Explorer is part of a package of Internet tools and services called Internet Connection for OS/2 that IBM is essentially giving away with the new OS/2 Warp, Version 3.

As of November, this product was freely available only as a prerelease version; upon completion it will be freely available to all OS/2 Warp users. To get Web Explorer (now or when it's finalized), just click the Update Software icon in the Internet Access group of OS/2 Warp's interface and the program will be downloaded from the Internet. Those with earlier versions of OS/2 can download the browser at ftpq1.ny.us.ibm.net.

As of this review—and as far as we or

in a couple of details about your system and location. Once it has the necessary info, the system dials out and registers you automatically.

You can, of course, use Web Explorer with other access providers, but you're on your own if problems crop up. Web Ex-

SUITABILITY TO TASK		
Web Explorer		
	Power	Ease
Setup and connecting		
Navigation		
Extensibility		

plorer's extensive on-line help doesn't deal with non-IBM connections. (Although IBM has clearly designed the product with modem-based connections in mind, Web Explorer can also be used with a direct LAN-based TCP/IP connection.)

POINT YOUR COMPASS

OS/2 Warp's browser is easy to navigate: Buttons and pull-down menus guide you effortlessly through the Web and its services. When navigating between several loaded documents, you can move backward and forward with the click of a button. Like most of the products we tested, Web Explorer lets you store your favorite home pages in an easily accessible hotlist. Web Explorer (like Frontier Technologies' WinTapestry) goes beyond standard capabilities to let you access multiple Web pages simultaneously, but OS/2 Warp's multitasking capabilities make the process smoother than with other products. You can even run multiple sessions of Web Explorer simultaneously.

CONFIG CINCH

The Web explorer is also easy to configure. A pull-down menu lets you customize everything from font sizes and colors to the use of your own applets for file viewing.

In addition to Web Explorer, IBM's Internet Connection for OS/2 provides a complete set of native OS/2 tools for accessing Internet services. The list of applications includes e-mail, FTP, a news reader, and telnet.

Despite the fact that it is quite literally

in a category by itself, Web Explorer is clearly going to be a major contender in the Web browser arena. It may be the only OS/2 game in town, but it's definitely one you'd want to play in. We strongly recommend that all OS/2 users check it out. Of course, you can't run it under Windows. But if IBM smiles and says "That's the point," you can hardly blame them.

► **Web Explorer.** IBM Corp., Armonk, NY; 800-342-6672; fax, 800-426-6063.

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Frontier Technologies Corp.

• WinTapestry

BY KEVIN REICHARD

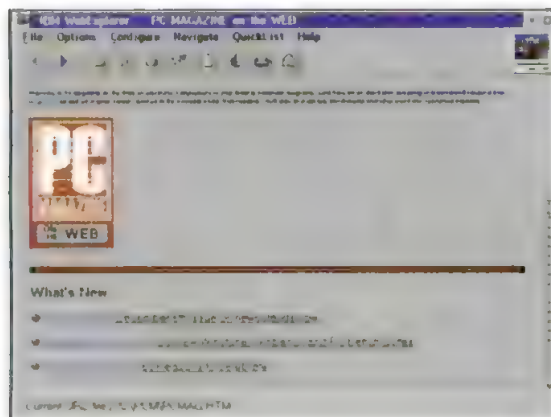
Frontier Technologies Corp.'s WinTapestry is a stellar tool for sampling the wares of the World-Wide Web. Preconfigured to connect with an amazing 410 archie, FTP, Gopher, Veronica, WWW, and WAIS servers, WinTapestry is among the most fully prewired browsers in existence. Unfortunately, getting its parent program, the \$149 SuperHighway Access for Windows, properly installed and configured can be a bit of a headache.

Before installing SuperHighway Access, you'll need to have either a preexisting dial-up account with an Internet service provider (Frontier provides none) or an existing TCP/IP connection. Frontier does, however, include scripts for 53 modems and log-in configurations for 44 service providers, subdivided by protocol (CSLIP, PPP, or SLIP).

CONFIGURATION ARCANIA

For many Internet users, this configuration process will probably seem pretty arcane—after all, dial-up connections have a well-deserved reputation for being finicky. If your dial-up script doesn't work immediately—as was the case when we connected to the Minnesota Regional Network, for example—you may find yourself experimenting with the underdocumented SuperHighway Access scripting language to work out the problem.

Telephone support from Frontier (which is available only to registered users of the company's SuperTCP product and requires a long-distance call to suburban Milwaukee) was adequate, if slow. In the end, problems were solved by the time-consuming process of trying several slight-



Along with its full-featured toolbar and menu options, Web Explorer has a nifty 3-D status icon that is animated when Web pages are loading.

IBM knows—Web Explorer is the only native OS/2 Web browser on the market. Built from the ground up by the folks at Big Blue, it's neither a rehash of an existing Windows-based product nor a minimalist make-do. Web Explorer is a complete, full-featured browser designed to take specific advantage of the operating system.

IBM has done an excellent job of making connections to its Internet access service (the IBM Global Network, also called Advantis) transparent to users. Setup is no more complicated than filling

ly different scripts over and over. We can't blame Frontier for the anarchy among dial-up service providers, but the product's documentation—both printed and on-line—should devote more attention to the daunting task of configuration.

Since SuperHighway Access is Winsock

menu and you'll be presented with a list of states. You don't need to worry if the ultimate destination is an FTP, Gopher, telnet, Usenet newsgroup, or Web site. (There is explicit support for archie, Gopher, Veronica, and WAIS servers within WinTapestry, however, should you need them.)

Adding your personal favorite Web resource is delightfully easy; just select the Add button on the toolbar and attach the resource to the appropriate category—or create your own set of categories. Instead of placing an emphasis on the *process* of cruising the Internet, SuperHighway Access puts the emphasis on the content *within* the Internet—a crucial difference that most Web browsers fail to address.

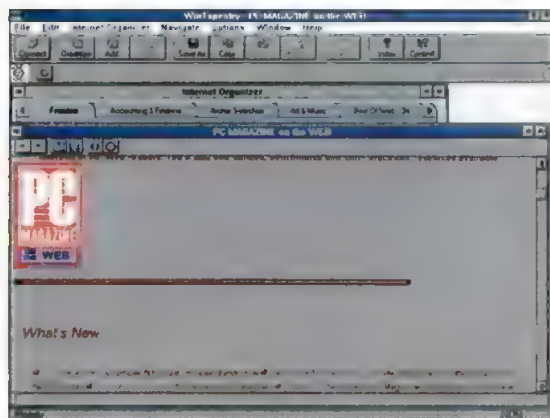
Unfortunately, you'll need separate SuperHighway Access tools to access mail and newsgroups. With their varied

than a unified package for browsing the World-Wide Web.

This doesn't diminish the ultimate worth of WinTapestry, however. If you're looking for a Web browser that points you in the direction of hundreds of useful resources, WinTapestry should be on your short list of contenders. Just walk in with your eyes wide open—and build in some frustration time when configuring your dial-up connection.

► **WinTapestry.** Frontier Technologies Corp., Mequon, WI; 414-241-4555; fax, 414-241-7084; e-mail, superhighway@Frontiertech.com.

Circle 460 on reader service card



Although the tabs, toolbar, and menu take up a good bit of the screen, WinTapestry's graphical rendering is one of the best around, with a full 3-D look and shading.

1.1-compliant, you can use it with any other Winsock-compliant tools you fancy, such as Cello, NCSA Mosaic, or Netscape Navigator. You probably won't want to, though, as WinTapestry is (as we mentioned) preconfigured to take you effortlessly to an amazing number of sites on the Internet—perhaps as many as 1,000 if you count all the secondary (submenu) links.

INFO FOR ALL

The World-Wide Web was envisioned as a vast supranational pool of universally accessible information. In theory, it shouldn't matter if the information is maintained on

interfaces, the SuperHighway tools are more a collection of disparate programs

SUITABILITY TO TASK		
	Power	Ease
WinTapestry		
Setup and connecting		
Navigation		
Extensibility		

an FTP, Gopher, or Web server; more importantly, the user shouldn't need to make these distinctions, either.

WinTapestry fulfills this egalitarian promise by organizing sources by subject, such as politics, education, or science. Want to grab some position papers from your state government? Just click on Government Information under the Politics

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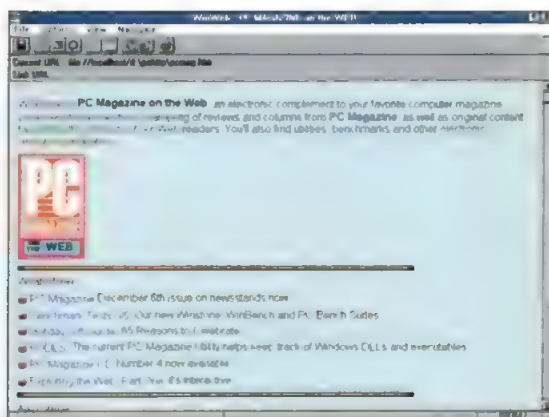
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integration with EInet's Galaxy site gives you access to some stellar information. And that alone sets WinWeb apart.

You can download WinWeb from <ftp.einet.net> as a .ZIP file containing the application and viewers for .GIF, text,

allows you to search the local galaxy server, other Web sites, or even Gopher servers. Though the Galaxy page is your default home page, you can change this to a different Web page or local file if you like.



Information is the thing with WinWeb. It has limited navigation ability (with only a backward navigational icon, not a forward one), and its rendering of pages is not outstanding.

and .WAV files. Setup is simple and well-described in the included README file. But as we said, WinWeb's access stands out in one important respect: its integration with the EInet Galaxy site.

This terrific World-Wide Web site offers a comprehensive and varied starting home page. In addition to a range of links—from amateur radio to societal law—the site provides a search engine that

This package ranks right in the middle for ease of navigation. WinWeb supports history lists, pages you have traveled to during the current session, and hotlists—permanent lists of oft-visited pages. All are reliable and easy to access, but two important features are missing: a Move Forward button for when you're navigating through a range of pages (oddly, a Move Back button is provided) and the ability to keep multiple hotlists or to add pages to the hotlist with a single click, both of which would make your travels on the Web more efficient.

STATUS-MINDED

When you load a page, the browser keeps you informed of transfer status in a small pop-up window; it also shows details about the current page and URL links defined in the document. One complaint: The page doesn't load until all its images have transferred, making it seem slow. Forms work as they should, and WinWeb's overall

compliance with both HTML and Microsoft Windows is good. WinWeb's error messages are clear, to the point, and accurate. Print (with Print Preview) and Save to File features are provided.

Although customizing certain features (such as fonts and background colors) is easy, you'll find yourself editing the .INI file if you ever change or add viewers, since you can't do it within the program.

SUITABILITY TO TASK

	WinWeb	
	Power	Ease
Setup and connecting	FAIR	GOOD
Navigation	GOOD	FAIR
Extensibility	FAIR	FAIR

The toolbar is limited and noncustomizable. Furthermore, WinWeb supports neither e-mail nor newsreaders.

WinWeb has some great things to offer—its basic features, a well-thought-out guide to Internet resources, and a strikingly rich home page—making it a package to consider for most users. But it definitely has some strikes against it that may make you think twice: the inability to do newsgroups and e-mail and some navigational awkwardness. □

► **WinWeb, Version 1A21.** EInet, Austin TX; 800-844-4638; fax, 512-338-3897; e-mail, winweb@einet.net.

Circle 461 on reader service card

■ Connecting to the Web: New Twists

By Rick Ayre

Some of our readers have pointed out to us that many Internet users don't connect in the "normal" way (using TCP/IP and Winsock); they log on to an Internet server using either a terminal or a modem with terminal emulation software and a shell account. Unfortunately, these methods don't support graphical Web browsing.

UPPING THE ANTE

Developers have been listening to the needs of people with Unix shell access to the Internet who want to be able to use a graphical Web browser—the result being that two ways to connect using a kind of pseudo-SLIP access

have recently appeared. A third, even simpler method is on the way.

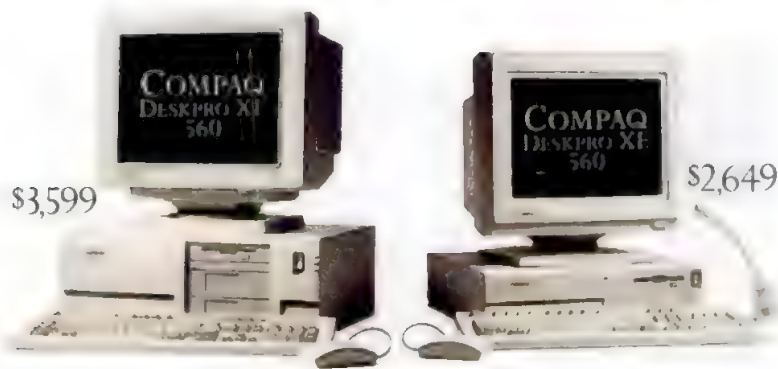
Remsock and The Internet Adapter (TIA) are two new shareware packages for graphical access, both of which run on an Internet host. To connect using either, log on to your shell account, execute the program on the host, and click on your Web browser.

You can download Remsock (\$15) from <ftp://oslonett.no/Shareware/Windows/Comm/remsock.zip>. It works with SunOS 4, Solaris 2.3, and Ultrix 4.2 operating systems. The Internet Adapter (\$25) works on Sun SPARC, Solaris 2.x, SunOS 4.1.x, and a number of other operating systems. For information about TIA's availability

and compatibility, send e-mail to tia-info@marketplace.com.

The newest way to surf the Web SLIP-less is SlipKnot, also a shareware product. (It was still in beta testing at press time, and pricing had not yet been set). SlipKnot, a Web browser with TCP/IP and most of the Winsock translation handled internally, resides on your terminal. It requires only that your host have a line-mode Web browser running on a server (accessible by typing either "lynx" or "www"). Since it executes no other code on the host, it should work with any host on which you have a shell. At press time, SlipKnot was available at <ftp.netcom.com/pub/pbrooks/slipknot>. □

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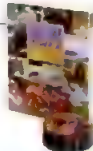
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DESKTOP SCANNERS

Color For All

New affordability and ease of use has brought color scanners within the reach of business and home users.

By Alfred Poor

Once upon a time you had to come up with a pot of gold to get a rainbow out of your computer. In the last few years, however, the widespread adoption of Microsoft Windows has prompted a series of colorful developments in the marketplace. First, color monitors became inexpensive enough to let you

work on your screen in color. Then reasonably priced color printers let you produce color output for presentations and reports. Now affordable color scanners are letting you move color images from paper to screen to output.

Just as with color printers, the prices for color scanners have fallen significantly in recent years. For example, BIS Strategic Decisions, a marketing research organization based in Norwell, Massachusetts, tracked prices of 300- by 600-dot-per-inch-resolution color scanners from market leaders Hewlett-Packard and Microtek from the second quarter of 1992 to the second quarter of 1994. In 1992, the HP ScanJet IIc had a list

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HIGHLIGHTS

Color Scanners

COLOR IS NOT JUST for professional graphic artists anymore. Now that 24-bit color scanners are available for only a few hundred dollars more than gray-scale models, business users are discovering the joys of scanning in color images for use in brochures, reports, and presentations. Affordable color printers let users reproduce captured color images inexpensively.

EASE OF USE has improved. Most of the 16 scanners we tested were easy to install, and all of them came with automatic exposure features. Six scanners came with software that allows you to calibrate scans to your monitor or output device.

OUR TESTS SHOW that color desktop scanners are better than ever at reproducing color photographs, but some of them had problems with shadow detail, color accuracy, image brightness, and posterization. Still, these scanners are fine for producing images for newsletters and presentations, in addition to filling the OCR and line-art niches of traditional monochrome scanners.

TWENTY-FOUR-BIT scanners provide 8 bits each for the red, green,

and blue color channels, resulting in more than 16 million possible colors. We also reviewed five 30-bit scanners and two 36-bit scanners, which are supposed to pass the best 24 bits of information to a software application; this results in a more accurate and detailed range of color definition. Our tests did not show the 30- and 36-bit scanners to be obviously better as a group than the 24-bit scanners.

ONE MARK of a good color scanner is its Twain driver. This bit of software lets you scan in images directly from any Twain-compatible application. It also determines how accurately an initial scan captures an image and how easily you can correct or alter attributes such as color balance, hue, and saturation. Better drivers give you intuitive, menu-driven access to these variables as well as special-effects filters and other high-level controls.

OUR PANEL of judges picked the scan produced by the HP ScanJet IICx as most faithful to our original color test photo. For black-and-white images, we judged results from the Microtek ScanMaker III as tops.

COLOR YOUR WORLD

When prices were higher and color scanners were more difficult to install and use, the only people who could justify the expense and hassle were professional graphic artists. They needed to be able to scan in photographs and hand-drawn artwork to compose pages for publication, create mock-ups of pages and products, and perform other creative tasks. Mainstream users mostly purchased gray-scale scanners for such tasks as scanning documents for document management and archiving,

or they used a scanner together with optical character recognition (OCR) software as a method of inputting text. An automatic document feeder, which is offered as an option with all the scanners reviewed here except the Agfa Arcus II, the Envisions DynamicPro 30, and the UMAX PowerLook PS 2400X, is appropriate for these tasks. Seven of the scanners come standard with OCR software.

Now that color printing has become affordable and prices of several 24-bit color scanners have fallen to within \$100 to \$200 of some gray-scale units, color scanning has become an attractive vehicle for adding visual spice to business documents. Flatbed scans of color photographs and illustrations may not be of sufficient quality for such mainstream publications as magazines, but they are fine for newsletters, brochures, reports, and presentations (on paper or on-screen). Color scanners are also useful for placing low-resolution scans in page layouts for proofing. The low-resolution scans are then replaced by high-resolution scans at the service bureau or prepress house.

REVIEW CRITERIA

To make it into this review, a scanner had to be able to offer 24-bit color-scanning capabilities. We also required a minimum of 300-dpi optical vertical and horizontal resolution. And we required the units to have a list price under \$5,000 and a ship date no later than October 1994.

Ten vendors answered the call with a total of 16 qualifying models. Advanced Network Systems, AVR Technology, Fujitsu Computer Products of America, Nikon Electronic Imaging, Relisys, and Ultima International all had color scanner products that shipped too late for our review. In addition to the FS2 reviewed here, Ricoh Corp. had a less expensive unit, the IF110, that also shipped too late for our review. Spark International was unable to provide us with its \$4,995 Spectrum Scan III+.

PC Magazine Labs put each of these scanners through extensive testing to de-

price of \$1,995. By the second quarter of 1994, the equivalent later-model HP ScanJet IICx was priced at \$1,179. Similarly, Microtek's two 300- by 600-dpi offerings fell from \$1,295 to \$895 and from \$1,995 to \$1,699, respectively, from 1992 to 1994.

Scanners comprise one of the fastest-growing markets in the computer industry. U.S. shipments of all scanners were expected to top 1 million units in 1994, and the annual growth rate for all flatbed scanners is projected to be 30 percent for 1993 through 1998, according to BIS. Color scanners are the fastest-growing segment within the scanner market, projected at a 36 percent annual growth rate over the same period.

Our Contributors: ALFRED POOR is a contributing editor of *PC Magazine*. STEVEN C. M. CHEN, JONATHAN HILL, and TED NEEDLEMAN are frequent contributors to *PC Magazine*. MARLA G. MILNE is a freelance graphic artist. LEON ERLANGER was the editor in charge of this story, and MICHAEL J. ZULICH was the project leader.

termine maximum resolvability of line art, scanning speed for both 24-bit color and 8-bit gray-scale scanning, and accurate reproduction of gray-scale and color continuous-tone images. Most of the scanners reviewed here are targeted toward mainstream business users who will not have the time or skill to tweak their scans extensively. To see how our test scanners could best fill the needs of these users we created the color and gray-scale scans (shown on the Performance Tests pages) by scanning with default settings and doing some quick adjustments to see if the default scan could be improved with little effort.

The results varied, but most scans had problems in any of several areas, including shadow detail, color accuracy, posterization, color banding, or general brightness of the scanned image. The scanner that came closest to reproducing both our

color and gray-scale image accurately was the HP, though even its images were not up to the images produced by a good drum scanner (see the sidebar "Beating the Drum?").

Color depth or bit depth defines how many tones or colors each pixel in a scanned image can reproduce. Twenty-four-bit scanners provide 8 bits for each red, green, and blue color channel, resulting in 256 possible brightness levels per channel, or more than 16 million possible colors. Two of the scanners reviewed here, the Arcus II and the Microtek ScanMaker III, offer 36-bit color depth, while five other scanners—the Agfa StudioScan II, the DynamicPro 30, the Epson ES-1200C Pro PC, the PowerLook, and the Ricoh—offer 30-bit color depth.

This extra color depth may seem extravagant at first blush, especially since programs such as Adobe Photoshop for

Windows 2.5 (which we used for our testing) can't handle more than 24-bit images. According to the manufacturers, however, the extra information makes it possible to pass the best 24 bits of information to a software application, resulting in a more accurate and detailed range of color definition. The advantage may not be evident in the initial scan, but as an image is edited and manipulated, the extra accuracy supposedly decreases the amount of information lost in processing so that your edited image will show more shadow detail and less posterization.

Bit depth is not the only determinant of a scanner's ability to reproduce color and shadow detail accurately, however. For example, the quality of the driver software can influence the final product as much as bit depth, or more. In fact, our tests did not show 30- and 36-bit scanners to be obviously better as a group than 24-



● Hewlett-Packard ScanJet IIcx

Building one color desktop scanner to suit all users—from businesspeople to graphics professionals—is a tall order. But we believe Hewlett-Packard has done it.

The Hewlett-Packard ScanJet IIcx garnered our Editors' Choice designation when we looked at color scanners a year ago, and from this year's field of 16 it is again best in show. The HP's combination of image quality, features, and price is unparalleled. For a very reasonable \$1,000 on the street, you get straightforward SCSI installation and a good software bundle including Aldus PhotoStyler and AccuPage, and HP's excellent Twain module.

The Twain module lets you painlessly calibrate your scanner to your monitor and color printer. It employs an unorthodox menu system but provides one-click access to customized scan settings. HP's Twain module also provides a full complement of user-defined settings, from color saturation to image scaling and image mirroring.

Most importantly, the 400- by 800-dpi HP is adept at line art, continuous-tone color photographic images, and

everything in between. The unit's default settings required minimal tweaking to achieve an excellent reproduction of our test color photo, and our *PC Magazine* jury unanimously judged the result as the closest to the original photograph. Simply put, the HP delivers great scans at a great price.

HONORABLE MENTIONS

Graphics professionals who need better resolution and color depth should look to the Microtek ScanMaker III. It offers optical resolution of 600 by 1,200 dpi and 36-bit color scanning—albeit at a somewhat pricey \$3,499 list (\$2,499 street price). The bundle includes all the software a pro needs, including Adobe Photoshop 2.5 and Microtek's color-calibration software. Resolvability was an excellent 457 lines per inch. Despite its superior specs, the ScanMaker III was not as

successful as the HP at reproducing our color photo, though its gray-scale scans were the best of the bunch. Keep in mind, however, that our reviewers relied primarily on automatic settings. With some tweaking, a reasonably skilled user should be able to produce an excellent color scan.

If the HP and the ScanMaker III are overkill for your needs, consider the ENV6600S from Envisions Solutions, another honorable mention. This \$699 entry-level unit delivered excellent speed and acceptable scanned images at an unbeatable price. If you're going to be doing mostly OCR tasks or scanning line art or images for position only, you can save yourself a few hundred dollars.

And if the mere thought of buying and using a scanner makes your head spin, consider the Canon IX-4015 from Canon Computer Systems. This unit (\$699 street) is also ideal for less demanding scanning chores, and touts a "click-and-scan" approach to make setup and use as easy as possible for novices. The Canon's uncluttered Twain module and Ofoto software have advanced image-manipulation features available in case you want them, but they are designed for users who are intimidated by the complexities of color scanning.

bit scanners, and the best image we were able to produce came from the 24-bit HP. Of the three runners-up, the Ricoh is the only 30-bit scanner; the Envisions ENV6600S and the Microtek ScanMaker IIHR are both 24-bit models.

Although a unit's image quality is certainly more important than its scanning speed, quickness is a consideration. If you plan to do batch scanning or OCR work using a document feeder, for example, the difference between 1 minute per page and 12 seconds per page adds up. Scanning speed results varied tremendously for our 5- by 7-inch photograph. Triple-pass scanners scan an object three times using different-color lamps, whereas single-pass scanners capture the entire image in one pass. The two triple-pass scanners in our group, the ScanMaker IIHR and the Envisions ENV24Pro, showed the slowest (3 minutes 27 seconds) and fifth-slowest (1 minute 15 seconds) scanning times, respectively, for our color photo. The ScanMaker IIHR was also the slowest at scanning our black-and-white photograph (45 seconds), but the ENV24Pro was one of the faster scanners in the group (20 seconds). The fastest scanners were the ENV6600S (27 seconds for color, 16 seconds for gray scale), the Ricoh (30 seconds for color, 12 seconds for gray scale), and the Sharp JX-330 (33 seconds for color, 12 seconds for gray scale). The slowest by far were the Vista-S6 Pro (2 minutes 35 seconds for color, 30 seconds for gray scale) and the ScanMaker IIHR and the UMAX PowerLook (2 minutes 26 seconds for color, 30 seconds for gray scale). Average scanning times for all units were 1 minute 11 seconds for color and 24 seconds for gray scale.

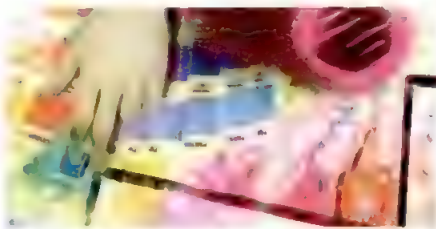
THE TWAINS SHALL MEET

Twain, support by all the scanners, has all but eliminated software hassles. This specification, developed by a consortium of hardware and software companies, lets scanner manufacturers write a single driver that can work with any Windows application that supports the Twain standard. Programs such as Photoshop and Calera's WordScan have an Acquire command on their File menu that lets you use a Twain-compatible scanner to bring an image directly into the program.

Not all scanners offer the same features within their Twain driver, however. Each

scanner provides its own module, and the modules give the user different degrees of control over the scanning process. Most of the scanners we tested had basic brightness, contrast, color gamma, cropping, and zooming tools. *Color gamma control* gives the user the ability to brighten or darken specified tonal ranges in an image selectively in order to highlight certain image areas. *Threshold control*, offered on 12 of the scanners, is used for monochrome line art and lets the user determine which pixels will be black and which will be white.

The features that separated the better Twain drivers from the pack were such ex-



*All the scanners in the group
had some sort of
automatic-exposure feature
that would adjust the
settings for each image.*

tras as sophisticated filters for sharpening or blurring edges or separate sets of controls for the red, green, and blue channels of the scan. HP's driver, which was one of the more powerful of the group, lets you adjust the brightness and contrast of a selected area of the image by clicking on it with a cross-hair pointer. The scanner then bases its automatic exposure settings on that area of interest. Also, while most scanners have one or two levels of sharpness adjustment, HP's module has five. Epson's Twain module lets you view three or five comparison screens to see the results of various settings. Agfa, Microtek, and UMAX also have powerful Twain modules.

Ease of use was also an important factor. For example, Envisions' and UMAX's Twain modules had easy access to most settings on one screen using buttons and sliders, whereas Agfa's and Sharp's modules required working with several levels of

menus to get at many of their image-tweaking functions.

All the scanners in the group had some sort of automatic-exposure feature that would adjust the settings for each image. For the typical nonexpert business user, this is perhaps the most important feature for achieving the best scans. The HP and the Ricoh achieved the best results with our test photos using default settings. The Agfa and Envisions scanners required the most tweaking.

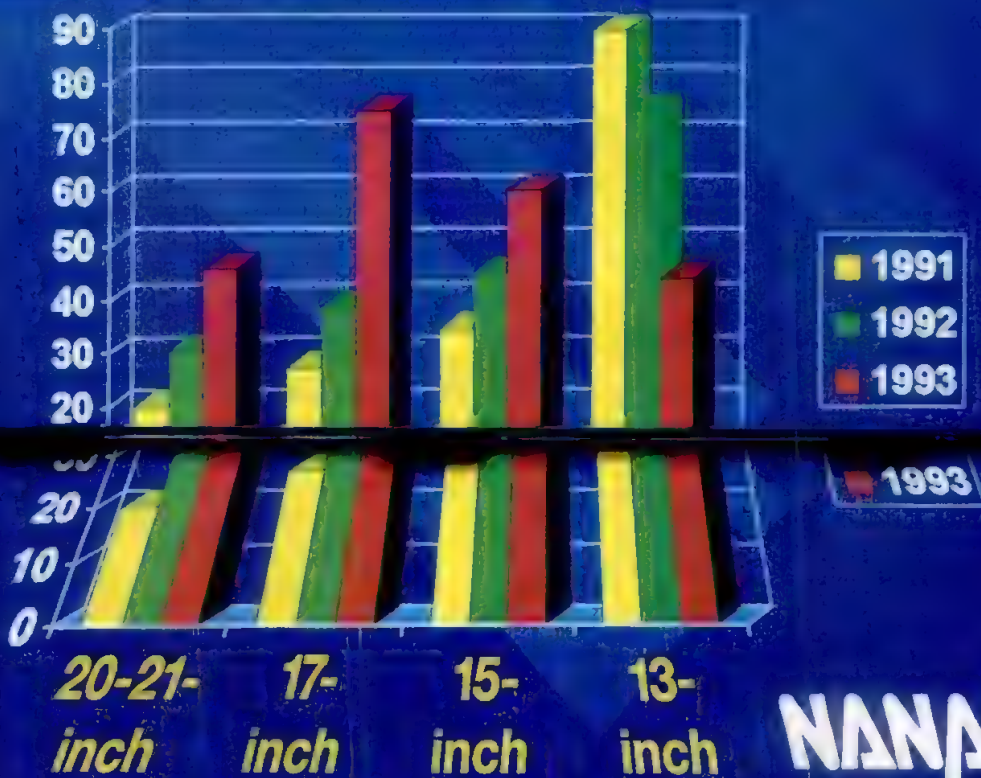
Another feature that had an impact on the default scan quality was color calibration. The lights used to illuminate the target image have tonal variations as a natural part of the manufacturing process, and the tonal qualities of an individual light can change over time. Color-calibration software makes color adjustments to match the physical attributes of a particular scanner. Six of the scanners came with some sort of color-calibration software. The Arcus II, the StudioScan II (both of which did not have full color-calibration capabilities), the Canon IX-4015, the HP, the Microteks, and the UMAX scanners also came with color target images; scan the image and the software automatically makes calibration adjustments based on the scan. Most color-calibration programs also let you calibrate your monitor. The Canon, HP, Microtek, and UMAX scanners even let you calibrate the scanner for a particular output device.

YOU SAY YOU WANT A RESOLUTION

The scanners in this feature boast optical resolutions from 300 by 600 dpi to 600-by-1,200 and interpolated resolutions up to 9,600-by-9,600. *Optical resolution* refers to the actual number of individually readable points that a scanner can discern per unit length and is expressed in pixels, dots, or lines per inch. Some scanners also feature hardware interpolation, which changes the speed of the sensors to approximate higher resolution in the vertical axis. Finally, some scanners offer software interpolation, where the driver program examines adjacent scanned pixels and computes intermediate pixels to create smoother images. Note that neither type of interpolation can put more information into the scanned image—that ability is determined by the hardware limitations—but either can create a better-looking image

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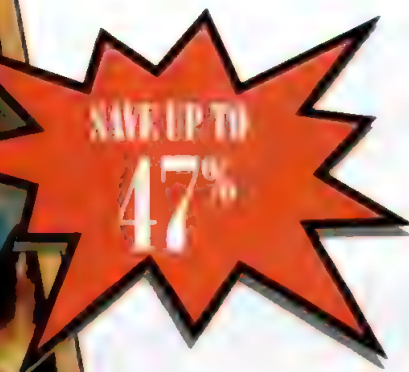
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Performance Tests: Color Scanners

No single scanner stood out in all areas of our performance tests. Though the HP ScanJet IIcx excelled in color image quality, it couldn't surpass the Microtek ScanMaker III when scanning black and white. The Sharp JX-330 exhibited the best resolvable resolution, while the Envisions ENV6600S proved to be the quickest.

How We Tested

Our test-bed consisted of a Compaq Deskpro/M 486/33 equipped with 16MB of RAM, a 310MB IDE hard disk, a Matrox MGA Impression graphics card set to 800-by-600 resolution in 24-bit color, and a MAG InnoVision 17-inch monitor. Prior to testing, we calibrated the monitor to a gamma reading of 1.8 and a white-point reading of 6,500 degrees Kelvin. We printed all the scanned images on a Tektronix Phaser 440 thermal dye transfer printer after calibrating the printer to the monitor. We installed each scanner with its supplied interface card and Twain driver (used within Adobe Photoshop for Windows, Version 2.5) and ran performance tests using default settings.

Though a scanner's image quality is more important than its speed, how quickly a unit scans a page is a consideration if you intend to batch scans or do a lot of OCR work. For our speed tests, we scanned our 5- by 7-inch test photos in both

24-bit color and 8-bit gray-scale modes at 200 dots per inch. For each scanner, we placed the image at the upper-left corner of the scannable area and scanned it three times, reporting the average in the chart below. The fastest performer in 24-bit color mode was the Envisions ENV6600S. This unit, with a single-pass engine manufactured by UMAX Technologies, completed the scan in just 27 seconds. The Microtek ScanMaker IIHR, with a triple-pass engine, took a regrettably slow 3 minutes 27 seconds to complete the same scan. In its defense, the extra time was worth the wait: Our jury found the ScanMaker IIHR's color results to be among the best of the lot. Times in 8-bit gray-scale mode were more closely grouped, ranging from 12 seconds for the Canon, Ricoh, and Sharp entries to 45 seconds for the Microtek ScanMaker IIHR.

We used the PM-189 Scanner Test Target—a line-art test page, which includes three compo-

nents (horizontal, vertical, and diagonal)—to assess each scanner's observed resolution in lines per inch (lpi). We did not adjust the thresholds for these scans, since very few of the vendors' Twain drivers allowed direct threshold adjustments (most offer only brightness and contrast controls). None of the scanners produced observed resolutions (image A resolvability) approaching their claimed maximum optical resolutions. The scanner with the highest observed horizontal resolutions was the Sharp JX-330 at 559 lpi, followed by the Envisions DynamicPro 30 and the UMAX PowerLook PS 2400X, both of which managed 508 lpi. (The claimed maximum optical resolution for these units is 600 lpi.) In general, though, scanners that claimed higher optical resolution turned in higher observed resolutions than those scanners that claimed lower optical resolution.

We also used the PM-189 test image for a 200-dpi, 8-bit gray-scale mode and 24-bit color-mode scan of a 37-step discrete gray-level strip (not pictured). Results from both the gray-scale-mode and color-mode scans should be similar, as both scans can discern a minimum of 256 shades of gray—well in excess of the 37 steps measured. We evaluated the displayed image and report the number of gray steps observed. Each of the scanners produced an acceptable image, with the Microtek ScanMaker III producing a remarkable 35 steps in 8-bit gray-scale and 36 steps in 24-bit color.

	SPEED TESTS		PM-189 SCANNER TEST TARGET			GRAY-SCALE TARGET	
	24-bit color mode (minutes: seconds)	8-bit gray-scale mode (minutes: seconds)	Image A resolvability Horizontal (lines per inch)	Vertical (lines per inch)	Diagonal (lines per inch)	24-bit color mode (number of observed steps)	8-bit gray-scale mode (number of observed steps)
Agfa Arcus II	1:24	0:41	320	320	284	31	24
Agfa StudioScan	0:48	0:14	320	320	284	28	23
Agfa StudioScan II	0:53	0:17	229	229	254	24	28
Canon IX-4015	0:45	0:12	254	254	254	23	23
Envisions DynamicPro 30	0:33	0:28	508	508	457	31	30
Envisions ENV24Pro	1:15	0:20	457	457	457	27	24
Envisions ENV6600S	0:27	0:16	320	320	320	32	30
Epson ES-1200C Pro PC	0:43	0:32	320	320	254	23	33
HP ScanJet IIcx	0:34	0:15	284	320	320	36	33
Microtek ScanMaker IIHR	3:27	0:45	284	320	320	32	35
Microtek ScanMaker III	1:05	0:33	457	457	406	36	35
Panasonic FX-RS308Ci	1:05	0:29	229	284	254	35	33
Ricoh FS2	0:30	0:12	457	457	361	35	33
Sharp JX-330	0:33	0:12	559	559	508	35	35
UMAX PowerLook PS 2400X	2:26	0:30	508	558	508	26	28
UMAX Vista-S6 Pro	2:35	0:30	284	361	320	26	26

Let's talk scanners.

AT MICROTEK, WE DON'T MAKE COMPUTERS AND WE DON'T MAKE

Whatever you buy a scanner for — document management, desktop publishing, graphic arts — you want the best scanned image possible, the most advanced features and the highest value for your hard-earned dollar.

A REPUTATION FOR INNOVATION.

While many of the names in today's scanner market were still making computers, laser printers...or even radios, of all things, Microtek was racking up an impressive array of firsts.

Microtek brought the first halftone desktop scanner to market in 1984. Microtek was also responsible for the first 256-tone grayscale scanner, the first affordable desktop color scanner, the first affordable 35mm slide scanner. With the recent introduction of Dynamic Color Rendition (DCR), Microtek produced the first automated color calibration and correction system. And now, with the ScanMaker III and ScanMaker 45t, we're the first to market with honest 36-bit desktop color scanners.

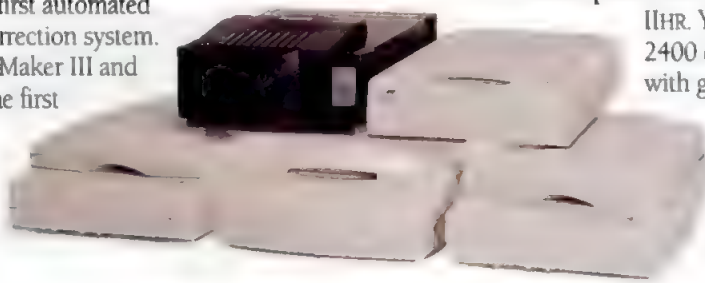
HIGH QUALITY MADE HIGHLY AFFORDABLE.

Don't need color scanning capabilities? Then don't buy them. The Microtek ScanMaker IIg is a great text and grayscale scanner with software enhanced resolution up to 1200 x 1200 dpi and a street price around \$400.

Want color but don't want to spend big bucks? Look into the ScanMaker II — you get 24-bit color flatbed scanning *and* Adobe Photoshop LE for around \$550.

Looking for a fast, single-pass scanner for office and graphic applications? The ScanMaker IISp, winner of two Editors' Choice Awards from *PC Magazine* and *Imaging magazine*, has software enhanced resolution up to 1200 x 1200 dpi and a street price around \$750.

For more sophisticated applications, there's the ScanMaker IIHR. You'll get resolution up to 2400 x 2400 dpi — which makes it very popular with graphic artists — and a price from around \$800 to \$1100, which makes it very popular, period.



Microtek's Family of Scanners includes: ScanMaker III, ScanMaker IIHR, ScanMaker II (shown with optional Transparent Media Adapter), ScanMaker 45t and ScanMaker IISp.



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No matter how much money you want to invest, you'll find your best value is with Microtek. For example, most Microtek scanners include Adobe Photoshop LE, Micrografx Picture Publisher or Caere's OmniPage Direct OCR (optical character recognition software) at no extra cost.

Microtek is the world's largest desktop scanner manufacturer. For over a decade we've made more scanners and have a history of more scanner awards and innovations than anyone else. And since we don't divide our attention between computers, photocopiers, printers and miscellaneous electronic products, we can concentrate on making the finest scanners in the business.

For current scanner prices, the nearest authorized Microtek reseller, or for your free copy of our scanning primer *The Scanned Image* call 800-654-4160 or fax a request to 310-297-5050.

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With 36-bit color resolution, the ScanMaker III and ScanMaker 45t generate far more information than any 24- or 30-bit scanners. A palette of 68-billion colors means unparalleled richness, clarity of detail and color accuracy that rivals scanners costing thousands of dollars more.

The award-winning ScanMaker III is a fast, single-pass flatbed scanner with DCR color calibration, software enhanced resolution up to 2400 x 2400 dpi and a street price under \$2700, even with its Transparent Media Adapter. You read it right, under \$2700!

For the most demanding work, the ScanMaker 45t offers photographers and graphic artists software enhanced resolution of 2000 x 2000 dpi for scanning transparent images up to 5" x 5" at a street price around

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Jury Analysis: Color

We had each reviewer scan our 5- by 7-inch test photo at 200-dpi resolution using the highest color depth supported by the scanner. The reviewers were free to make basic adjustments in software to get a better image, and the scanners were calibrated to our output device, a Tektronix Phase 440 thermal dye printer. Photographer Thom O'Connor designed a photograph that would tax a scanner's ability to resolve shadow detail and render colors and skin tones accurately. A jury of *PC Magazine* staff and reviewers performed an inspection of each scanner's output, comparing it with the original photograph. Scanner names, claimed resolution, and scan speed were not made known to the jurors.

Some images turned out too dark and others too bright, but our jury was unanimous in picking the HP ScanJet IIcx's output as the closest to the original print. The HP scanner exhibited the best sharpness of the group, produced even tones, and did a good job of balancing shadows and highlights while maintaining detail. Also worthy of praise was the Ricoh FS2, which produced good detail in the sweater ribbing and shadowed portions of the faces, as well as accurate color tones.



Original color photo



Agfa Arcus II
(\$3,495)



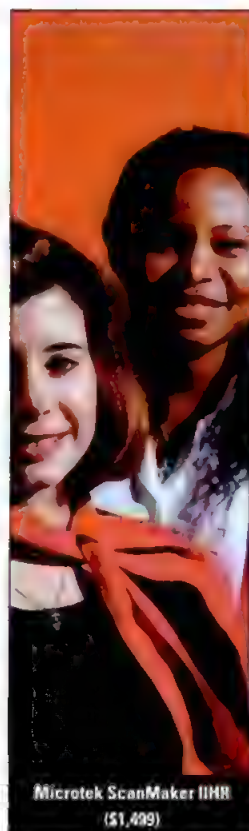
Envisions ENV6600S
(\$699)



Epson ES-1200C Pro PC
(\$1,495)



HP ScanJet IIcx
(\$1,179)



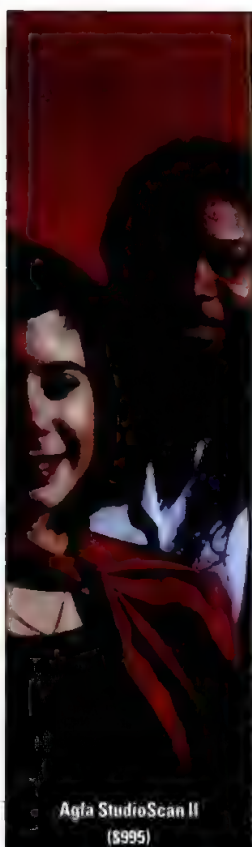
Microtek ScanMaker IIMH
(\$1,499)



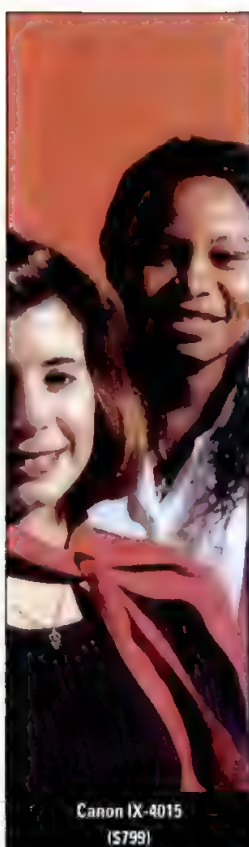
Microtek ScanMaker III
(\$3,499)



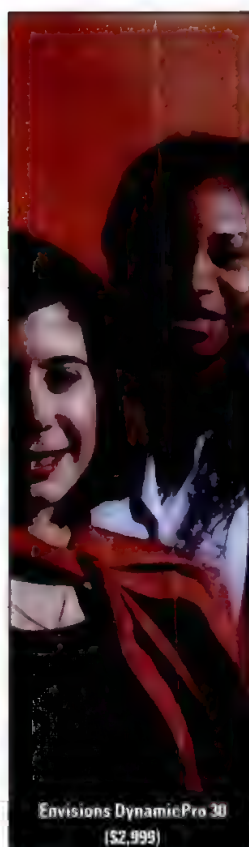
Agfa StudioScan
(\$800)



Agfa StudioScan II
(\$995)



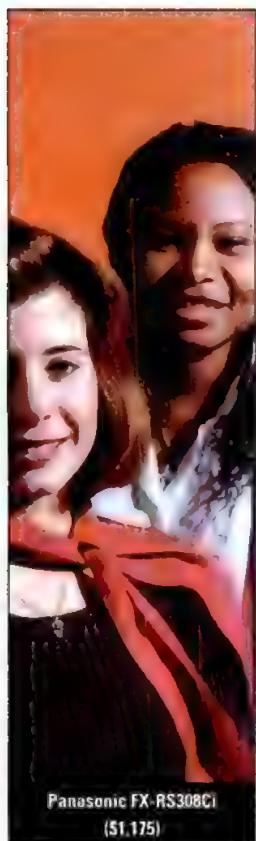
Canon IX-4015
(\$799)



Envisions DynamicPro 30
(\$2,999)



Envisions ENV24Pro
(\$899)



Panasonic FX-RS308Ci
(\$1,175)



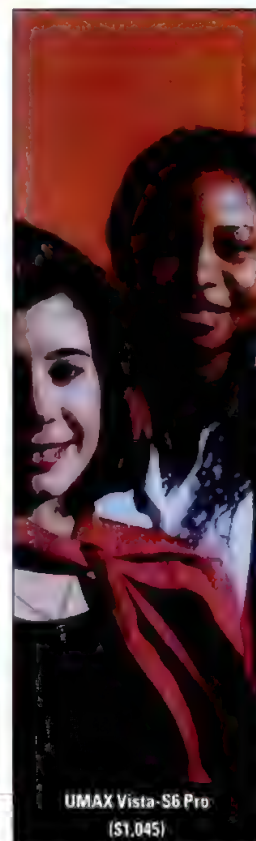
Ricoh FS2
(\$2,595)



Sharp JX-330
(\$1,499)



UMAX PowerLook PS 2400X
(\$3,495)



UMAX Vista-S6 Pro
(\$1,045)



Jury Analysis: Gray-Scale

We had our photographer shoot the same threesome, this time using black-and-white print film. Again, the high-contrast image, with bright highlights and deep shadows, was meant to tax each scanner's abilities. Reviewers tweaked the scans to some degree to improve particularly poor images.

Our jury judged the most faithful reproduction to be that from the Microtek ScanMaker III. The Microtek scanner produced a sharp image with good shadow detail, even tonality, and a full range of shades. Our jury selected the Sharp JX-330's image (not pictured here) as a close second in terms of gray-scale output.

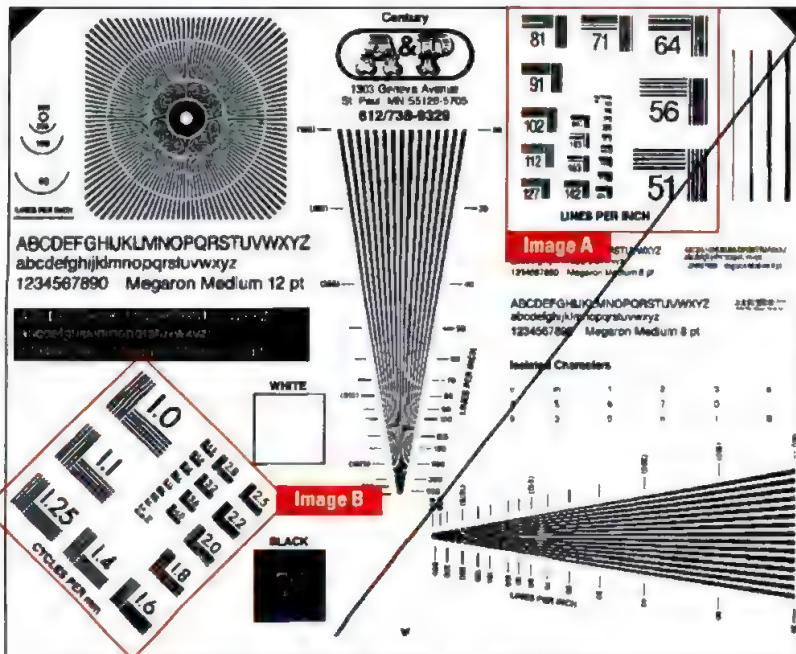
Poor black-and-white images fell into two camps. Some were too

dark, with poor detail and sharpness (represented here by the Agfa StudioScan's output). Others (such as those produced by the Epson ES-1200C Pro PC) looked too washed out, with burnout in highlight areas and poor contrast.

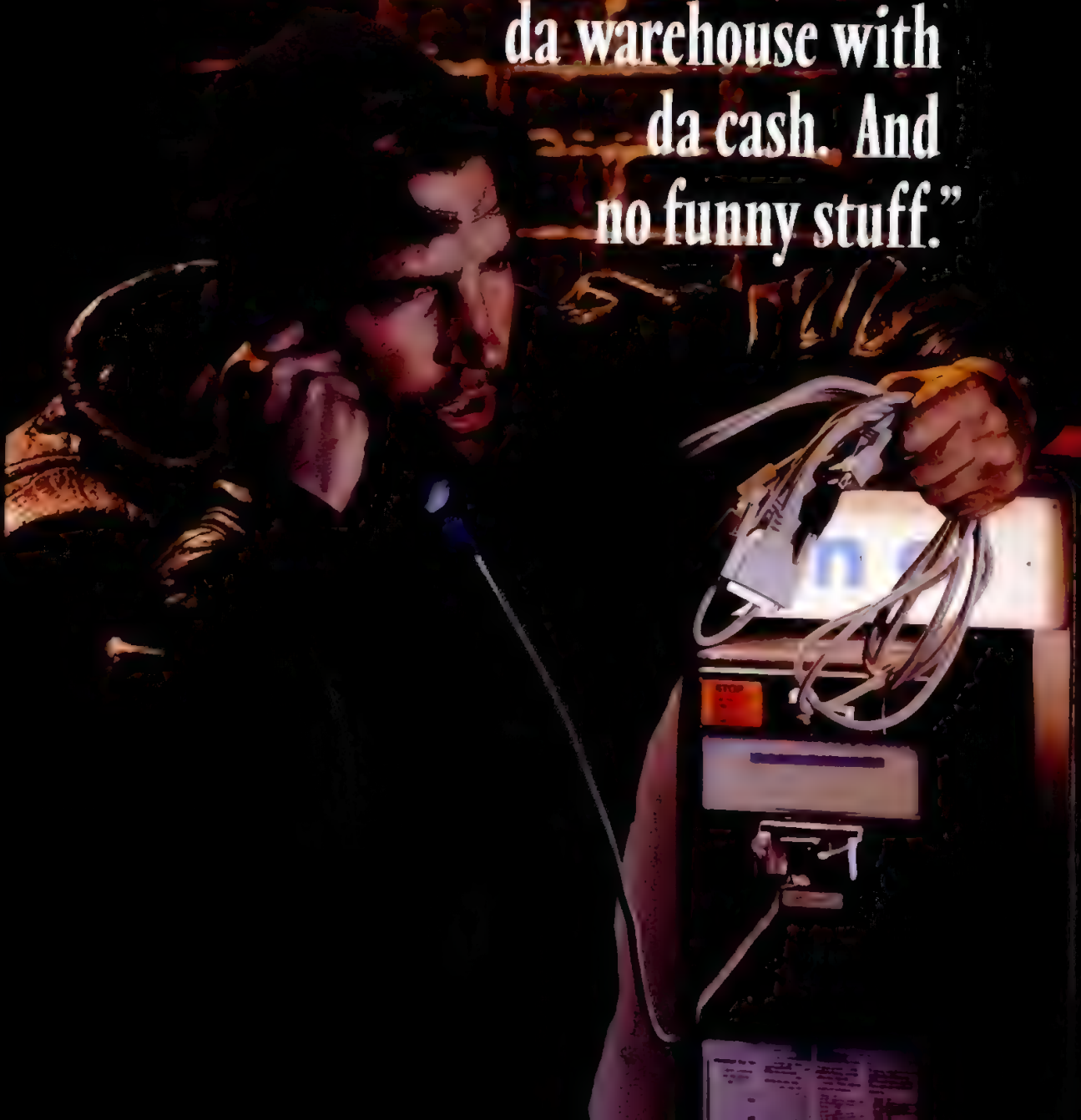
PM-189 Scanner Test Target

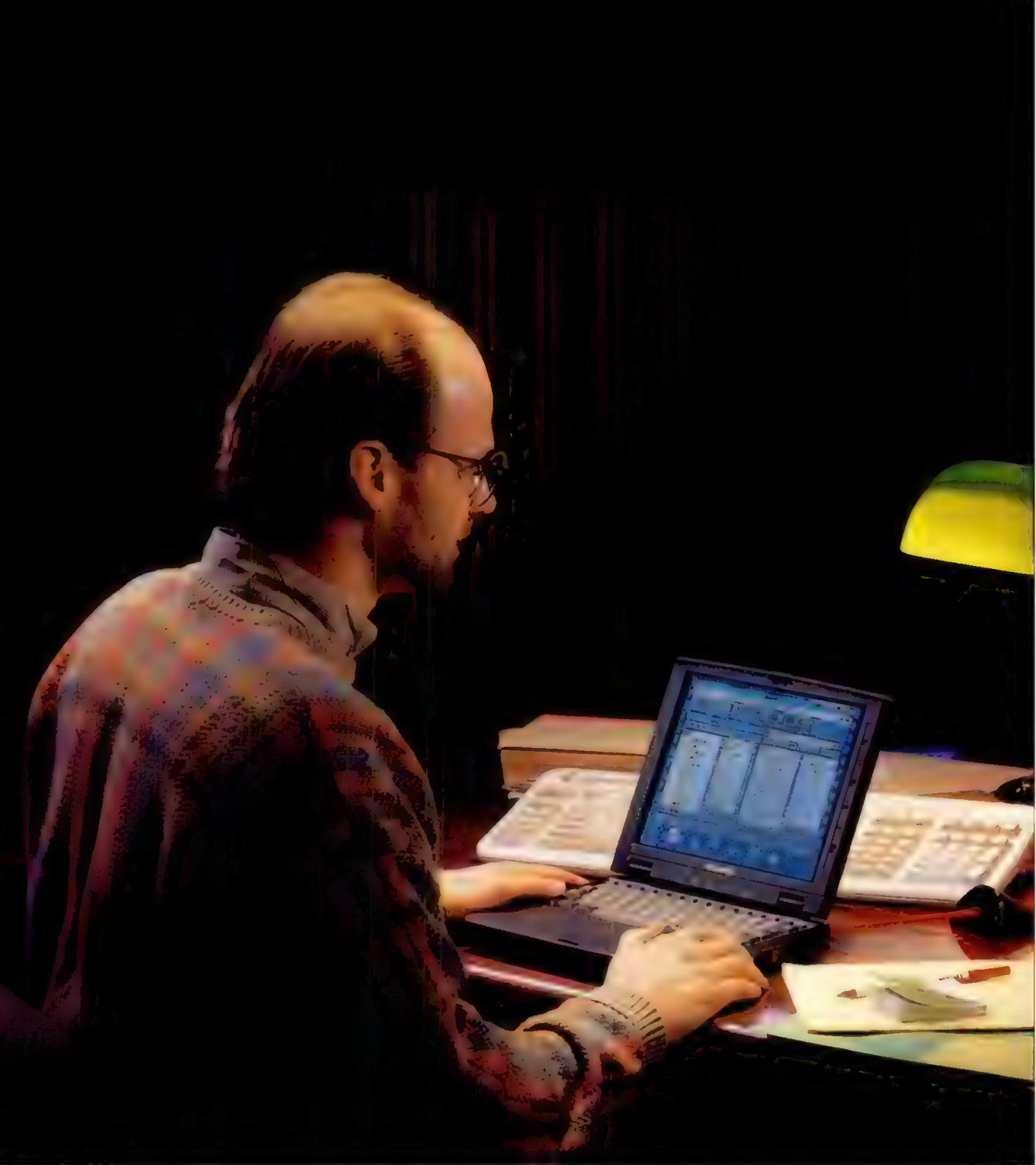
Our line-art test page was Century A&P's PM-189 Scanner Test Target, an industry standard. We used the microcopy-resolution test pattern (labeled *image A* here and in the data table) to determine each scanner's horizontal- and vertical-resolution capabilities, or *resolvability*, which we report in lines per inch (lpi).

Image B is the identical pattern, rotated 136 degrees counterclockwise from image A. This lets us see how well a scanner can resolve unaligned images. Most of the scanners showed diagonal resolvability (shown in cycles per millimeter on the target, converted to lpi in the data table) lower than their rated horizontal and vertical resolutions.



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for continuous-tone images.

In fact, our tests showed that most scanners actually scan at less than their optical resolutions. Our resolvability tests produced results of 559 lines per inch or lower, though scanners with the highest stated optical resolutions tended to achieve the highest resolutions on our tests.

Keep in mind that you probably won't need the highest resolutions offered, however; as a rule of thumb, you only need to scan to the same resolution as your output device. If you are sending the file to a prepress house to create halftones, you'll want to scan at 1.5 to 2 times the intended halftone screen's lines per inch (if you want a 110-lpi screen, you'll want to scan at a resolution of 220 pixels per inch). If you scan at too high a resolution, the output results can actually lose quality, since information will be discarded in scaling down the image for output. Higher resolutions become important if you need to enlarge the scanned image—for example, when the original is a 35-mm slide.

BUNDLED SOFTWARE

All of the scanners in the group included some software to make your scanner more useful right out of the box. The most common package was image-editing software, and Photoshop 2.5 was the hands-down winner of the popularity contest, as it was offered with 12 scanners (though 3 of those came with a limited version of Photoshop called Photoshop LE). Most vendors should be shipping Photoshop 3.0 by the time you read this. The DynamicPro 30 and the Epson also included the full version of Kai's Power Tools, which gives you an impressive set of transformations that you can apply to images, while the two UMAX scanners included a less feature-packed version of the Kai software called Power Tools SE.

Of the seven scanners that came with OCR software, Caere Corp.'s OmniPage Direct was bundled in three of them.

Whether you're a business user looking for an inexpensive scanner that's easy to use or a graphic artist looking for maximum color depth and image-tweaking capabilities, one of the scanners reviewed here should fill the bill.

Agfa Division, Miles Inc.

• **Agfa Arcus II** **Agfa StudioScan** **Agfa StudioScan II**

BY TED NEEDLEMAN

The three scanners we reviewed from Agfa have some features in common, but each is intended for a different type of user. The 300- by 600-dpi, 24-bit Studio-

ware. The full FotoTune lets you calibrate the scanner to the monitor and output device and also includes a color scanner test target. Agfa's Twain driver, FotoLook, offers both an automatic mode and a comprehensive array of adjustments (including those for gamma, hue, and saturation). Making the adjustments is easy, though locating some of them in the menu hierarchy can be less than intuitive. For example, you set the scanning resolution by specifying the *output* device resolution.



The Agfa Arcus II, Agfa StudioScan, and Agfa StudioScan II.

Scan (\$800 street price) is an entry-level product suitable for small-office/home-office and OCR use; the 30-bit, 400- by 800-dpi StudioScan II (\$995 street), with OmniPage Direct OCR software and an optional automatic document feeder (\$600), is aimed at more sophisticated business users; and the 600- by 1,200-dpi, 36-bit Arcus II, with a list price of \$3,495 (including a transparency module), is targeted toward graphics professionals. The three offer straightforward installation and good (if sometimes quirky) software, but printouts of our test scans were disappointing.

At about 8.5 by 14 inches, maximum scannable area is nearly identical across all three units. All three are interfaced through a standard SCSI-2 adapter, available from Agfa (\$200) or a third party. Agfa bundles Adobe's Photoshop 2.5 LE and its own FotoTune Light with the StudioScan and StudioScan II units; the Arcus II gets the full versions of the soft-

Also, the documentation is written for both the Macintosh and PC versions of the software, with the greater emphasis on the Mac. A PC-specific edition is in the works.

Regardless of the color depth scanned, all three units actually pass only the most accurate 24 bits to the application; we didn't notice a difference between the 24-bit scan and the 36-bit one. We also didn't see the expected degree of difference in resolution among the three units. Even though optical resolution varies from the StudioScan's 300-by-600 to the Arcus II's 600-by-1,200, the resolvable resolution achieved using the PM-189 test pattern was identical for the two—even after extensive tweaking of the threshold settings. Even worse, the quality of the scans using the default Twain settings was not what one might expect from a company with Agfa's reputation in high-end imaging. With all three units, our color test-photo printouts turned out downright morose—far too dark, with

corresponding loss of color subtleties and detail (especially in shadowed areas). We had similar problems with the black-and-white test photo. Even when we calibrated the scanners to our Tektronix thermal dye transfer printer, it was difficult to get a scan that replicated the detail shown on the monitor screen. We were able to get a fairly decent scan on the monitor but always got a dark printout.

As for performance, the three scanners are a bit slow, but none alarmingly so. At 1 minute 24 seconds, the Arcus II took longer than the other Agfas to scan our color photo. The StudioScan took 48 seconds, a few seconds less than the StudioScan II. Agfa does give you both a comprehensive Twain driver and a good selection of ancillary software. Still, some of the competing units we looked at produced better results.

► **Agfa Arcus II.** List price: \$3,495. **Agfa StudioScan.** Estimated street price: \$800. **Agfa StudioScan II.** Estimated street price: \$995. Options for all three units: *Automatic document feeder*, \$600; *transparency adapter*, \$500. Agfa Division, Miles Inc., 200 Ballardvale St., Wilmington, MA 01887; 800-635-4271, 508-658-5600; fax, 508-658-4193.

Circle 462 on reader service card

Canon Computer Systems Inc.

• Canon IX-4015

BY TED NEEDLEMAN

Just as Canon's camera division was quick to hop on the "point-and-shoot" autofocus-SLR bandwagon, Canon Computer Systems has joined the ranks of the "click-and-scan" brigade with the IX-4015. Aimed squarely at the small-office/home-office market, this compact, affordable unit (\$799 list, \$699 street) comes bundled with easy-to-use Ofoto scanning/imaging software (from Light Source Computer Images) and Caere Corp.'s OmniPage Direct OCR package. The Canon's small size and footprint make it an attractive offering for cramped offices, while an optional automatic document feeder extends the maximum scannable document length to 14 inches.

Everything about the 24-bit, 400- by

800-dpi Canon is designed for ease of use. Installation of the SCSI interface is covered in a Quick Start card, and installation of the Twain driver and Ofoto does not take long. Canon's Twain driver is uncluttered yet provides settings for resolution,



The Canon IX-4015.

composition (line art, gray scale, color), threshold (for monochrome), and size. Second-level menus let you make further adjustments. Or you can just leave everything on automatic.

Perhaps this unit's best feature is the software it is paired with. Light Source's Ofoto offers many of the controls of high-performance packages such as Adobe Photoshop and Picture Publisher, but almost all of these controls can be ignored unless you really feel like playing with them. About the only thing you need do other than click on the Scan button is calibrate the scanner to the printer. This is done by printing out a test pattern on the printer you will be using and then scanning it in. The software "knows" what colors are supposed to be there and then adjusts itself.

Indeed, our panel judged the Canon's color output to be quite acceptable. The image was a little bright, but the colors were fairly accurate. Our test black-and-white scanned image was too dark, however. The unit's showing on our PM-189 test target put it near the bottom of the pack. Resolvable resolution was just 254 lpi, and its number of discernible gray-scale steps (23) was the worst in the lot.

Still, there is a lot to be said for a product like this. At less than \$700, the Canon IX-4015 gets you up and running fast and keeps you scanning without a lot of fuss. If you need publication-quality color or black-and-white photos from your scanner, look elsewhere. If you will be doing

mostly OCR work and scanning line art and you want to fly on auto-pilot, give the Canon a good look.

► **Canon IX-4015.** List price: \$799; *automatic document feeder*, \$349. Canon Computer Systems Inc., 2995 Redhill Ave., Costa Mesa, CA 92626; 800-848-4123, 714-438-3000.

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Envisions Solutions Technology Inc.

• Envisions DynamicPro 30 Envisions ENV24Pro Envisions ENV6600S

BY STEVEN C.M. CHEN

Envisions Solutions Technology targets three market tiers with its line of color flatbed scanners. The entry-level ENV6600S (\$699 list) delivers good speed and acceptable scan quality at an unbeatable price, and is ideal for less demanding applications where color accuracy and flawless images are not required. We found that the midrange ENV24Pro (\$899 list) produced sharper images, though color accuracy again is not a strong point. The high-end DynamicPro 30 (\$2,999) is targeted at the graphics professional and showed the best resolvable resolution of the three, but our subjective judgments of the color test photo leave us wondering about the unit's price tag.

The ENV6600S and ENV24Pro ship with Xerox's Textbridge OCR package, and all three deliver Envisions' DynaScan DS Twain driver. This driver offers a full set of controls (including those for gamma correction, saturation, hue, and so on) to fine-tune scans, which is fortunate, because we were generally unhappy with results produced by the driver's automatic mode.

The letter-size, 24-bit ENV6600S delivers 300- by 600-dpi optical resolution (interpolated up to 4,800 dpi in software) and includes Photoshop LE, a scaled-down version of Adobe's popular image-editing package. The only setup glitch we encountered with Envisions' units involved the ENV6600S: We had to install the pass-through SCSI terminator before the software would recognize the scanner. Surprisingly, our jury judged color output from the ENV6600S as superior to that of its more costly siblings, though still not spectacular.

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HARDWARE

Color Scanners

Both black-and-white and color images lost some of their sharpness. Resolvable resolution (at 320 lpi) and gray-scale imaging (30 steps in 8-bit gray-scale mode, 32 steps in 24-bit color mode) were acceptable for an entry-level unit. Speed from the single-pass

olution and a scan bed of 8.3 by 11.7 inches. But we found scanned images showed too little detail in shadow areas and tended toward the red. Maximum resolvable resolution, at 508 lpi, was second only to the Sharp JX-330's and UMAX PowerLook



The Envisions DynamicPro 30, Envisions ENV24Pro, and Envisions ENV6600S.

ENV6600S was a strong point. It took only 27 seconds to scan our color test image in 24-bit color mode—the fastest of the 16 scanners we tested in this roundup. In 8-bit gray-scale mode, the scan took a mere 16 seconds, which placed the unit near the top of the pack.

The legal-size, 24-bit ENV24Pro boasts an optical resolution of 600-by-1,200, with software interpolation to 9,600 dpi. The ENV24Pro did a much better job than the ENV6600S when it came to image sharpness. But it did poorly on color accuracy, with too much magenta saturation. On our PM-189 test target, maximum resolvable resolution reached a respectable 457 lpi. The number of discernible gray-scale steps—24 in 8-bit mode and 27 in 24-bit

PS 2400X's 559 lpi. The number of observed gray-scale steps—30 in 8-bit mode and 31 in 24-bit color—was good but not spectacular.

All three Envisions scanners tended to produce images that are much darker than the originals, resulting in a loss of many details. So if you are looking for perfect images and prefer not to fuss with the Twain driver settings, you should stay away from these scanners. The \$3,000 price tag makes the purchase of the DynamicPro 30 hard to justify. But if perfect continuous-tone color images take a back seat to speed and affordability, either the ENV6600S or the ENV24Pro may be worth a look.

► **Envisions DynamicPro 30:**

Epson America Inc.

● Epson ES-1200C Pro PC

BY TED NEEDLEMAN

Available for both the Macintosh and PC, Epson America's ES-1200C Pro PC scanner comes in two bundles. The ES-1200C Pro version we tested (\$1,499 list, \$1,299 street) is the more complete, and includes an Adaptec SCSI interface card, cable and terminator, Twain driver software, a full version of Adobe Photoshop for Windows 2.5, and Kai's Power Tools image-effect software. The ES-1200C bundle, with a high-speed parallel interface card, bidirectional parallel cable, and a Twain driver, costs \$450 less.

Targeted at the low-end professional graphics market and general office user, the Epson offers 30-bit color depth and a maximum optical resolution of 600 dpi (2,400 dpi through software interpolation). Installation took a little while—there are lots of separate pieces of software to install—but it was problem-free. Epson's Twain driver is very robust. It features a fully automatic exposure, but you can also adjust almost every aspect of the scan process. When adjusting these settings, you can view three or five comparison screens to determine the effect of a variety of setting choices. The driver also provides a number of built-in calibration routines, as well as settings for different monitors, thermal or ink jet printers, and even dot matrix impact printers.

The software lets you choose between single- and triple-pass scanning. We tried both, and except for a much longer scan time, we noticed no difference. (Epson states that improved quality depends on

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■ Beating the Drum?

By Marla G. Milne

Just how good an image can you expect from the current generation of desktop color scanners? To find out, we sent our 5- by 7-inch color test photo to our prepress service bureau for a publication-quality scan on the

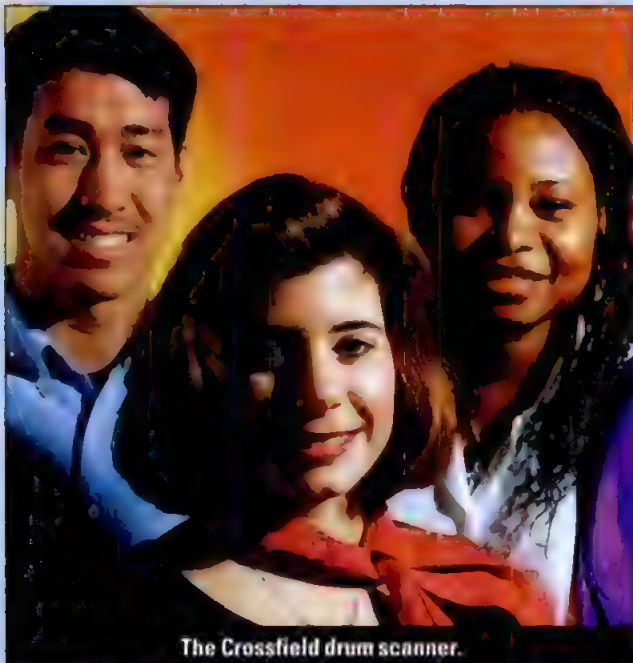
toward cyan. The clarity of the image was also no better than that produced by Ofoto.

GETTING BETTER

Advances in desktop scanning technology over the past few years have

saved to its final CMYK format.

Despite such advances, though, we were still at a disadvantage. Flatbed scanners use charged coupling device (CCD) arrays, which have difficulty separating similar values in shadow and highlight color ranges. A drum

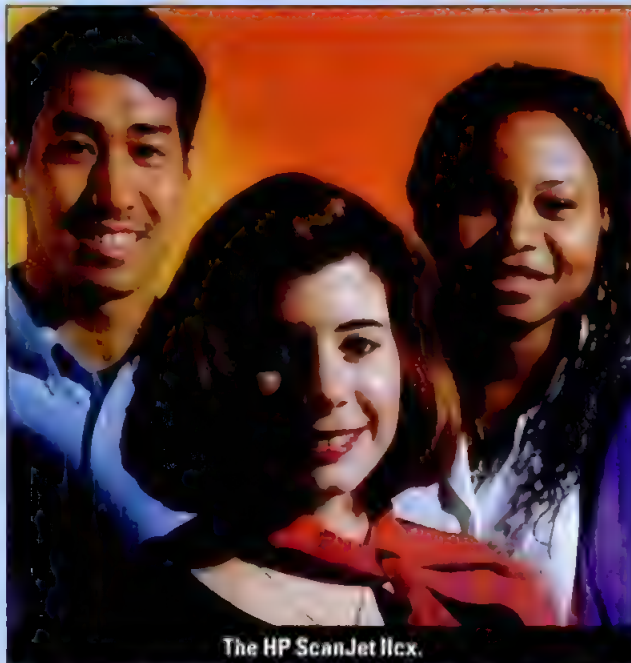


The Crossfield drum scanner.

bureau's \$300,000 Crossfield drum scanner. Meanwhile, back at PC Magazine Labs, we used the Hewlett-Packard HP ScanJet Ilex (our Editors' Choice honoree) and Ofoto (\$195 list price), an extremely capable scanning package from Light Source Computer Images, to produce the best possible in-house scan. We used Adobe Photoshop for Windows 2.5 for some final adjustments, then output both our scan and the drum-scanned image to a Tektronix 440 thermal dye transfer printer.

Just to make sure we hadn't underestimated the capability of the HP scanner driver, we reproduced the above steps as closely as possible using it instead of Ofoto. But we found that the HP driver produced oversaturated colors and showed a strong bias

improved the potential for professional-level results. Many scanners now come with software that can identify color inaccuracies resulting from the scanning and printing processes and compensate for them. The process used by Ofoto, called Adaptive Calibration, is based on a closed loop in which you print out a cyan, yellow, magenta, and black (CMYK) color chart and scan the printout. The Ofoto driver compares the new scan with the original color data and makes up a set of CMYK transform curves from the differences. You use Ofoto to create calibration sets for each printer/scanner combination you intend to use and select the correct set every time you scan. After you scan the image, Ofoto corrects the color data as the image is



The HP ScanJet Ilex.

scanner uses a photo multiplier tube, which has higher sensitivity and lower noise than a CCD. In addition, drum scanners (which have bit depths ranging from 30 to 48 bits) are able to collect more color than will be used in the final image and keep only the cleanest color values for the final CMYK file.

ARTIST AT WORK

Ofoto was very successful in matching the color balance and overall density values of the original. To further tweak our scan, we used Photoshop's Curve Map tool to lighten magenta values in the midtone range and reduce a slight cyan tint in the highlight range; the Level tool helped darken the blackest shadows to make the detail appear sharper. We chose Photoshop because of its position as

■ Beating the Drum? (cont. from previous page)

the market leader, but any image editor with Bezier curve control over the cyan, magenta, yellow, and black levels of the color image should serve as well. This process provided a very close match to the original print. It took some trial and error to arrive at our final result, as we visually evaluated printouts and made necessary adjustments. (Tip: To effect a color shift that your eyes can perceive, you have to change a color value by at least 2 to 3 percent.)

THE ENVELOPE, PLEASE. . .

Though the desktop scanner was successful at matching the colors of the original, it failed to maintain shadow detail and had a soft quality compared with the original—in spite of the sharpen filter applied during the scan. The smooth color gradation in the background became slightly posterized in the desktop-

scanned image. In comparison, the drum scanner produced an image file that expanded the values in the shadow area. This enhanced the detail and made the overall scanned image appear even sharper than the original photo, while still reproducing the smooth blend of the background gradation.

The verdict? You shouldn't cancel your account with your prepress service bureau quite yet. But you can improve markedly upon the image quality you get out of your desktop scanner's defaults, proportional to your level of expertise and the time you are willing to invest. A capable graphic artist somewhat familiar with an image-editing package should be able to make the necessary adjustments. You might not mistake the output for a match print from your service bureau, but you can certainly improve upon the default image. □

the specific document being scanned.) In single-pass mode, the Epson completed our test scan in just 43 seconds, which puts it near the front of the pack. It was among the slowest, however, in 8-bit gray-scale mode (32 seconds). On the color test photo, our jury judged the image to be too bright, with artificially heightened color and some burnout in highlight areas. The black-and-white image was also too bright and had an overall fuzzy effect. Maximum resolvability (320 lpi) and discernible gray-scale steps in 8-bit color mode (33) were middle-of-the-road, while the number of discernible gray-scale steps in 24-bit mode (23) was the worst we saw. On the other hand, Epson's documentation was terrific, and the company offers an automatic document feeder for batch OCR jobs.

The Epson ES-1200C Pro PC wasn't the best overall performer. The package is very complete, but you can get better image quality at a lower price from other scanners in this roundup.

► **Epson ES-1200C Pro PC.** List price: \$1,499; automatic document feeder, \$499;

transparency adapter, \$959. Epson America Inc., 20770 Madrona Ave., Torrance, CA 90509; 800-289-3776, 310-782-0770; fax, 800-289-3776.

Circle 465 on reader service card

Hewlett-Packard Co.



EDITORS' CHOICE
HP ScanJet IIcx

BY JONATHAN HILL

Last year's Editors' Choice honoree, Hewlett-Packard Co.'s HP ScanJet IIcx (\$1,179 list, \$1,000 street) maintains its edge with a combination of solid design, robust features, and innovative extras. The 400- by 800-dpi (1,600 dpi with interpolation), single-pass HP provides top-quality flatbed performance on traditional scanner tasks from continuous-tone color photography to line art. Our panel unanimously voted the HP's test-photo results as truest to the original color photo.

Bundled software includes

HP's own DeskScan II scanning software, a full-featured Twain driver, and Aldus PhotoStyler SE. You also get AccuPage 2.0, which works with leading OCR software packages to improve their accuracy and versatility, and HP Copier, which lets the HP double as a 300-dpi photocopier when used in combination with HP-compatible laser printers. The Windows-based installation couldn't have been easier: Hook it all together and run the setup program from Program Manager. The software walks you through the rest. Unlike other SCSI-based scanners, there is no need to load device drivers into your CONFIG.SYS file; instead, HP provides protected-mode drivers that load from Windows' SYSTEM.INI file.

HP's Twain driver is among the best in the business. It includes easy-to-use support for a closed-loop monitor and printer calibration. The Tools menu allows you to adjust the unit's Auto Exposure settings by clicking on highlighted and shadowed areas in your image, and you can preadjust the color emphasis by clicking on a depiction of a three-dimensional (RGB) color wheel. An information screen identifies the scanner type, lists the attached devices, and displays the resolution, scan type, and special effects that you have selected.

Much of this functionality is buried in the Twain driver's unorthodox but efficient Print Path menus. In HP's implementation, you don't pick a resolution or scan type directly. You create or choose one of the many preset "print paths" that contain this information. While this method takes some getting used to, it does provide one-click access to customized scan settings that are unattain-



The HP ScanJet IIcx.

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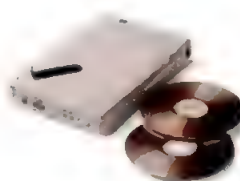
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- 8MB RAM expandable to 32MB
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T2400CT FEATURES:

- 486™ DX2/50MHz, 3.3v
- 8KB cache
- 8.4" dia. color TFT-LCD active matrix display
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- 8MB RAM expandable to 24MB
- 6.5 lbs.

T2400CS FEATURES:

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CIRCLE 379 ON READER SERVICE CARD

able with less powerful models.

The HP is based on the company's single-pass, single-exposure scan engine. Color registration errors were virtually nonexistent, and the HP's use of RGB color information in gray-scale scans of color images nearly eliminates the color dropout associated with engines that use a single color (usually green) to generate gray-scale images. Our jury tests confirm that excellent results can be obtained without a lot of customization. With our difficult test color photo, the scanner retained almost all the detail in shadowed areas while delivering very accurate colors. The black-and-white image, too, retained good detail, though it tended to be a little bright. Maximum resolvability on our PM-189 test target was unimpressive (284 lpi horizontal, 320 lpi vertical), but discernible gray-scale reached an unbeatable 36 steps in 24-bit mode. Speed, too, was impressive. At 34 seconds, the HP was just a tick behind the fastest units on 24-bit color scanning, and was near the top in 8-bit gray-scale mode as well (15 seconds).

In short, the affordable HP ScanJet IIcx is an excellent general-purpose scanner that displays a well-designed approach to the problems of desktop scanning.

► **HP ScanJet IIcx.** List price: \$1,179; automatic document feeder, \$559; transparency adapter, \$759. Hewlett-Packard Co., Direct Marketing Organization, P.O. Box 58059, MS511L-SJ, Santa Clara, CA 95051; 800-722-6538, 208-323-2551; fax, 800-333-1917.

Circle 466 on reader service card

Microtek Lab Inc.

• Microtek ScanMaker IIHR Microtek ScanMaker III

BY ALFRED POOR

Microtek's two top flatbed scanners, the Microtek ScanMaker IIHR and ScanMaker III, boast 600-by-1,200 optical resolution, interpolated up to 2,400-by-2,400 in software. The 24-bit ScanMaker IIHR (\$1,499 list, \$1,099 street) is best for general business use (newsletters, reports, OCR), though its slow speed may be a drawback for some. The pricey ScanMaker III (\$3,499 list, \$2,499 street), with its additional 36-bit color depth and

speed, is better suited for the professional graphic artist who needs to do more editing and manipulation of the image.

Setup and configuration is easy, and both scanners came with a Twain scanning module, Adobe Photoshop for Windows, Version 2.5, and Microtek Scan-



The Microtek ScanMaker IIHR and Microtek ScanMaker III.

Wizard. The Windows-based ScanWizard lets you manage scanned images, view and print thumbnails, create copies by scanning directly to your printer, and even fax images from your scanner. The ScanMaker IIHR also includes a copy of Caere Corp.'s OmniPage Direct OCR software.

Both scanners include Microtek's Dynamic Color Rendition (DCR) color-calibration software, which automatically adjusts color settings for the scanned image using a special color target included in the package. The Twain module includes a range of useful features: zoom control; a color meter for spot readings; separate brightness and contrast for the red, green, and blue channels; shadow, midtone, and highlight control using a histogram; and a sophisticated gamma correction feature. You can also invert, mirror, or apply filters such as blur, sharpen, or emboss.

The triple-pass ScanMaker IIHR was the slowest on scans—3 minutes 27 seconds for 24-bit color—but its results were worth the wait. The color image tended to be a bit strong on the red side, but subtle shadings came through well. The automatic settings for gray-scale scans (also generated at a field-trailing clip, 45 seconds) produced a dark, muddy image, and needed to be lightened.

The single-pass ScanMaker III was much faster—1 minute 5 seconds for color and 33 seconds for monochrome—though still just average in the pack. It uses a single pass to make 36-bit scans—the highest color depth we saw—though its color-image scan also tended to the red side. Its

gray-scale scans of black and white were excellent—judged the best in the lot by our panel. Resolvability was an excellent 457 lpi, and the unit's performance on our gray-scale step chart could not have been better. In general, the automatic settings were very good, and would take very little adjustment to get an ex-

cellent image.

Both Microtek units have excellent software bundles that make them powerful and easy to use, and both are capable of excellent image quality.

► **Microtek ScanMaker IIHR.** List price: \$1,499. **Microtek ScanMaker III.** List price: \$3,499. Options for both units: Automatic document feeder, \$499; transparency attachment, \$699 (\$150 if purchased with the ScanMaker III). Microtek Lab Inc., 3715 Doolittle Dr., Redondo Beach, CA 90278; 800-654-4160, 310-297-5000; fax, 310-297-5050.

Circle 467 on reader service card

Panasonic Communications & Systems Co.

• Panasonic FX-RS308Ci

BY JONATHAN HILL

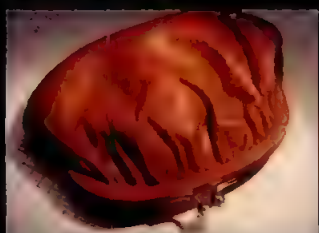
Panasonic's first 24-bit color flatbed scanner, the FX-RS308Ci (\$1,175 list, \$995 street), is an easy-to-use entry-level model that ultimately falls short on features and performance.

At 300 by 600 dpi (2,540-by-2,540 with interpolation), the Panasonic has the lowest optical resolution offered by the scanners in this roundup. In line-art mode, its resolution proved adequate for graphics that don't require precise color matching but too weak for enlarging detailed images.

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* Three-year limited hardware warranty. Certain restrictions and exclusions apply. **July 1994 issue.



Our jury panel found the unit's color image washed out and posterized while its black-and-white output was judged hazy and dark. Although the unit earned high marks on our gray-level test, gray-scale scans of our color target were flat and unappealing. The single-pass scanner turned in average times on our speed tests, scanning slower than similarly priced units and only about half as fast as the speedy HP ScanJet IIcx.

Installation was quick and painless with the Windows-based setup program, and the Panascan Plus Twain module worked fairly well within our testing software, Adobe Photoshop for Windows, Version 2.5. Panascan Plus provides a clean Twain implementation with a decent array of options, including automatic exposure control, sharpening, scaling, gamma compensation, and brightness and contrast controls. Slider bars for hue, saturation, and luminance provide color-adjustment capability, and you can improve the scanner's results in bright and dark areas with the highlight and shadow controls.

The Panasonic comes complete with Aldus PhotoStyler SE, Version 2.0 and an NCR-based 8-bit SCSI card. Panasonic also offers the FX-RS308C, a model that ships without the interface card and image-editing package, for about \$200 less. Both models include Twain-compliant Panascan Plus software. Other scanners at this price offer OCR software and a transparency adapter option, but the Panasonic unit comes with neither.

While the Panasonic delivered adequate output quality, it ranked near the bottom in speed and resolving power among the scanners selling for less than \$1,000. Its legal-size scan area, relatively versatile Twain implementation and docu-

ment feeder option (\$649), however, make it a reasonable choice for OCR, low-resolution imaging, or newsletter production.

► **Panasonic FX-RS308C1.** List price: \$1,175; automatic document feeder, \$649. Panasonic Communications & Systems Co., 2 Panascan Way, Secaucus, NJ 07094; 800-742-8086, 201-348-5200; fax, 201-392-4792.

Circle 468 on reader service card

Ricoh Corp.

• Ricoh FS2

BY JONATHAN HILL

The Ricoh FS2 color desktop scanner is a 600- by 1,200-dpi 30-bit scanner that ships with a host of productivity-enhancing software and, depending on the distributor, a genuine Adaptec 1542 SCSI-2 interface card. The color images it produced and the unit's speed were among the best we saw. But a stronger Twain driver implementation would be welcome for the Ricoh's \$2,595 list (\$1,995 street) price.

The Adaptec SCSI interface comes with Adaptec's EZ-SCSI software, which makes installation and setup a snap. The Twain module also installed rather easily, though was relatively short on image-enhancing features. You can adjust the brightness and contrast and the black-and-white balance for gray-scale work, but that's about it.

Color registration and maximum resolvability were very good, but our scans were consistently marred by seemingly randomly placed horizontal bands. Still, the color scan we were able to produce for our jury panel was among the best, chosen as second only to the HP ScanJet IIcx's output. The black-and-white scan retained the detail of the original photo, but needed some tweaking to improve the contrast.

Scan speed is excellent. The Ricoh placed second on our performance tests in 24-bit color mode, scanning our photo in just 30 seconds. In 8-bit gray-scale mode, the unit tied for first with the Sharp and Canon entries at just 12 seconds.

Ricoh does bundle some interesting software with the unit. In addition to the Twain module and Image-In, an image-editing package by CPI, Ricoh supplies Calera's WordScan (OCR software), MindWork's Recollect (a document-management package), and Laser Today's ColorLink, which allows you to send and receive full-color faxes.

In light of its Adaptec board, included software, speed, and image quality, the Ricoh FS2 comes close to justifying its steep price. Close.

► **Ricoh FS2.** List price: \$2,595; automatic document feeder, \$499.95; transparency



The Ricoh FS2.

adapter, \$959.95. Ricoh Corp., 3001 Orchard Pkwy., San Jose, CA 95134; 800-955-3453, 408-432-8800; fax, 408-432-9266.

Circle 469 on reader service card

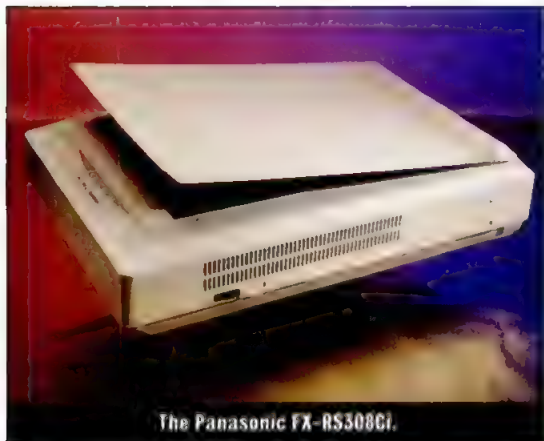
Sharp Electronics Corp.

• Sharp JX-330

BY ALFRED POOR

The \$1,499 (\$1,200 street) JX-330 is a solidly built 24-bit color scanner from Sharp Electronics. This speedy unit turned in some of the fastest times on our performance tests, and we found its image quality to be excellent for black-and-white and above average for color.

Resolution for the Sharp unit is 600 by 1,200 dpi, interpolated to 2,400 dpi in software. On our tests observable resolution was an unsurpassed 559 lpi. Software packages bundled with the unit include Adobe Photoshop for Windows, Version 2.5; Sharp's ScanJX (a standalone scanning application); and Media Cybernetics' Imager Lite, which lets you use the Twain driver without launching Photoshop 2.5 and adds multiple-page scanning capabilities.



The Panasonic FX-RS308C1.

► **S U M M A R Y O F F E A T U R E S**

Color Scanners

Products listed in review order

■ = YES □ = NO

	Agfa Arcus II	Agfa StudioScan	Agfa StudioScan II	Canon IX-4015	Envision DynamicPro 30	Envision ENV24Pro	Envision ENV600S
List price or estimated street price	\$3,495 (list)	\$800 (street)	\$995 (street)	\$799 (list)	\$2,999 (list)	\$899 (list)	\$699 (list)
Features							
Engine manufacturer	Info not available	Info not available	Info not available	Canon	UMAX	UMAX	UMAX
Engine type	Single-pass	Single-pass	Single-pass	Single-pass	Single-pass	Triple-pass	Single-pass
Dimensions (HWD)	7.9 x 16.1 x 23.6	5.6 x 15 x 21	5.6 x 15 x 21	3.1 x 11.3 x 15.9	5.4 x 13.1 x 21.2	5.8 x 13.4 x 21	4 x 13.2 x 20.7
Interface	SCSI-2	SCSI-2	SCSI-2	SCSI-2	SCSI-2	SCSI-2	SCSI
Rated maximum scan area (inches)	8.3 x 14	8.5 x 14	8.5 x 14	8.5 x 11.7 (8.3 x 14 with automatic document feeder)	8.3 x 11.7	8.5 x 14	8.5 x 11.7
Optical resolution in color mode (dpi)	600 x 1,200	300 x 600	400 x 800	400 x 800	600 x 1,200	600 x 1,200	300 x 600
Interpolated resolution in color mode (dpi)	2,400 x 2,400	2,400 x 2,400	2,400 x 2,400	800 x 800	9,600 x 9,600	9,800 x 9,600	4,800 x 4,800
Optical resolution in gray-scale mode (dpi)	600 x 1,200	300 x 600	400 x 800	400 x 1,200	600 x 1,200	600 x 1,200	300 x 600
Interpolated resolution in gray-scale mode (dpi)	3,600 x 3,600	2,400 x 2,400	2,400 x 2,400	1,200 x 1,200	9,600 x 9,600	9,600 x 9,600	4,800 x 4,800
Color depth	36-bit	24-bit	30-bit	24-bit	30-bit	24-bit	24-bit
Number of gray levels	4,096	256	1,024	256	256	256	256
Application software included	Adobe Photoshop 2.5, Agfa FotoTune Light 1.0	Adobe Photoshop LE, Agfa FotoTune LE 1.0	Adobe Photoshop LE, Agfa FotoTune Light 1.0	Ofoto 2.0	Adobe Photoshop 2.5, Kai's Power Tools 2.0	Adobe Photoshop 2.5	Adobe Photoshop LE
OCR software included	None	None	OmniPage Direct 2.0	OmniPage Direct 2.0	None	Xerox TextBridge 2.0	Xerox TextBridge 2.0
Color-calibration software included	None	None	None	Ofoto 2.0	None	None	None
Photocopying capability	□	□	□	□	□	□	□
Twain Module							
Twain driver and version included	Agfa FotoLook 2.05	Agfa FotoLook 1.26	Agfa FotoLook 2.03	IX-4015 Twain driver 2.0	DynaScan DS 2.0	DynaScan DS 2.0	DynaScan DS 2.0
Previewing							
Color/Black-and-white	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Zoom	■	■	■	■	■	■	■
Cropping	■	■	■	■	■	■	■
Number of brightness-control settings	N/A	N/A	N/A	256	200	200	200
Number of contrast-control settings	N/A	N/A	N/A	256	255	255	255
Threshold/Color-gamma control	□ ■	□ ■	□ ■	■ ■	■ ■	■ ■	■ ■
Image-enhancement filters							
Blur/Sharpen	□ ■	□ ■	□ ■	□ ■	■ ■	■ ■	■ ■
Emboss/Edge enhancement	□ □	□ □	□ □	□ □	□ □	□ □	□ □
Options							
Automatic document feeder	None	\$600	\$600	\$349	None	\$399	\$399
Transparency adapter	Built-in	\$500	\$500	None	Built-in	\$599	\$599
Service and Support							
Toll-free technical support	■	■	■	■	□	□	□
Hours (eastern time)	8:00-8:00 M-F	8:00-8:00 M-F	8:00-8:00 M-F	8:00 A.M.-11:00 P.M. M-F, 11:00-6:00 Sat	7:00-5:00 M-Th, 8:00-4:00 F	7:00-5:00 M-Th, 8:00-4:00 F	7:00-5:00 M-Th, 8:00-4:00 F
Warranty (parts and labor)	1 year	1 year	1 year	2 years	1 year with optional 2-year extension	1 year with optional 2-year extension	1 year with optional 2-year extension

N/A—Not applicable. The product does not have this feature.

* The UMAX Vista SE LE, which has the same hardware as the reviewed product, comes with OmniPage Direct 2.0.



Epson ES-1200C Pro PC	HP ScanJet IICx	Microtek ScanMaker IHR	Microtek ScanMaker III	Panasonic FX-RS308Ci	Ricoh FS2	Sharp JX-330	UMAX PowerLook PS 2400X	UMAX Vista-S6 Pro
\$1,499 (list); \$1,299 (street)	\$1,179 (list); \$1,000 (street)	\$1,499 (list); \$1,099 (street)	\$3,499 (list); \$2,499 (street)	\$1,175 (list); \$900 (street)	\$2,595 (list); \$1,995 (street)	\$1,499 (list); \$1,200 (street)	\$3,495 (list); \$3,299 (street)	\$1,045 (list); \$899 (street)
Epson	Hewlett-Packard	Microtek	Microtek	Matsushita	Ricoh	Sharp	UMAX	UMAX
Single- or triple-pass	Single-pass	Triple-pass	Single-pass	Single-pass	Single-pass	Single-pass	Single-pass	Single-pass
6.5 x 14.5 x 22.5	4.5 x 14.5 x 23	4.7 x 14 x 19.1	5 x 14.8 x 19.1	5.1 x 13.5 x 20.3	4.3 x 15.3 x 21.1	6.2 x 15.2 x 22	5.5 x 13.1 x 21.3	4 x 13.2 x 20.7
SCSI, parallel	SCSI-2	SCSI	SCSI	SCSI	SCSI-2	SCSI-2	SCSI-2	SCSI-2
8.5 x 11.7	8.5 x 14	8.5 x 13.5	8.3 x 13.5	8.5 x 14	8.3 x 11.7	8.5 x 14	8.3 x 11.7	8.3 x 11.7
600 x 600	400 x 800	600 x 1,200	600 x 1,200	300 x 600	600 x 1,200	600 x 1,200	600 x 1,200	300 x 600
2,400 x 2,400	1,600 x 1,600	2,400 x 2,400	2,400 x 2,400	2,540 x 2,540	1,200 x 1,200	2,400 x 2,400	2,400 x 2,400	4,800 x 4,800
600 x 600	300 x 600	600 x 1,200	600 x 1,200	300 x 600	600 x 1,200	600 x 1,200	600 x 1,200	300 x 600
2,400 x 2,400	1,600 x 1,600	2,400 x 2,400	2,400 x 2,400	2,540 x 2,540	1,200 x 1,200	2,400 x 2,400	2,400 x 2,400	4,800 x 4,800
30-bit	24-bit	24-bit	36-bit	24-bit	30-bit	24-bit	30-bit	24-bit
256	256	256	4,096	256	1,024	256	1,024	256
Adobe Photoshop 2.5, Kai's Power Tools 2.0	AccuPage 2.0, Aldus PhotoStyler SE	Adobe Photoshop 2.5, ScanWizard	Adobe Photoshop 2.5, ScanWizard	Aldus PhotoStyler SE	Agfa FotoTune Light 1.0, ColorLink, Image-In Color Professional 3.2	Adobe Photoshop 2.5, Imager Lite 1.0, ScanJX 1.4	Adobe Photoshop 2.5, Kai's Power Tools SE 2.0	Adobe Photoshop 2.5, Kai's Power Tools SE 2.0
None	Calera WordScan 3.0	OmniPage Direct 2.0	None	None	Calera WordScan 3.0	Xerox Textbridge 2.0 (with automatic document feeder)	None	None *
None	HP ColorSmart Support	Dynamic Color Rendition	Dynamic Color Rendition	None	None	None	MagicMatch 1.0	MagicMatch 1.0
□	■ (via bundled software)	□	□	□	□	□	□	□
Epson Twain/ Epson Scan II 1.04E	DeskScan II 2.1	Microtek Twain driver 1.52	Microtek Twain driver 1.52	Panascan Plus 4.03	CFM Twain for Ricoh 3.3	Sharpscan 1.0	Vistascan 1.1	Magicscan 1.2
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■	■	■	■	■	□	□	■	□
■	■	■	■	■	■	□	■	■
7	250	14	14	63	1,024	7	50	250
256	250	14	14	63	1,024	N/A	50	250
■ ■	■ ■	■ ■	■ ■	□ ■	■ ■	■ ■	■ ■	■ ■
■ ■	□ ■	■ ■	■ ■	■ ■	□ □	□ □	■ ■	■ ■
□ □	□ □	□ □	□ □	□ □	□ ■	□ ■	■ ■	■ ■
\$499	\$559	\$499	\$499	\$649	\$499.95	\$599	None	\$495
\$959	\$759	\$699	\$699	None	\$959.95	For 600 x 1,200 resolution, \$900, for 1,200 x 2,400 resolution, \$1,199	\$595	Built-in
■	■	■	■	■	■	■	■	■
9:00-9:00 M-F	24 hours, 7 days	10:00-8:00 M-F	10:00-8:00 M-F	9:00-5:00 M-F	11:00-8:00 M-F	8:00-8:00 M-F	6:00-5:30 M-F	6:00-5:30 M-F
2 years	1 year with optional 2-year extension	1 year	1 year	1 year	1 year	1 year	1 year	1 year

The Twain driver shipped with our JX-330 was still in beta, although all the driver's features were available. Setting options for the Sharp driver involves slightly more work than with other scanner drivers when it comes to fine tuning. Instead of having some of the most often-used tools available in one spot, you have to use the pull-down menus and set each option separately. The good news is that the default settings are good enough for most images.

Fast scanning is one of the strong points of the Sharp. It took only 33 seconds to scan our 5- by 7-inch color photo in 24-bit mode. Its 8-bit gray-scale time of just 12 seconds was likewise ahead of the pack. You can also shave several seconds off the already fast scanning times by scanning an image into the Twain driver first and then passing the final images to the application after fine tuning.

The Sharp was able to produce good results scanning our test images with the default settings. Its color image made our final round of judging; however, the colors lacked the richness of those produced by some of the competition. The black-and-white scan was a close second to the Microtek ScanMaker III, according to our panel of judges.

If you are looking for a good color scanner with a fast scan speed, then the JX-330 is a strong candidate.

► **Sharp JX-330.** List price: \$1,499; automatic document feeder, \$599; 600-by-1,200 transparency adapter, \$999; 1,200-by-2,400 transparency adapter, \$1,199. Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07463; 800-237-4277, 201-529-8200; fax, 201-529-9113.

Circle 470 on reader service card



The Sharp JX-330.

UMAX Technologies Inc.

• UMAX PowerLook PS 2400X UMAX Vista-S6 Pro

BY ALFRED POOR

The two entries from UMAX Technologies represent opposite ends of the color-scanner spectrum. Aimed at the professional graphics market, the \$3,495 (\$3,299 street)



The UMAX PowerLook PS 2400X and UMAX Vista-S6 Pro.

PowerLook PS 2400X scanner produces 30-bit scans at 600 by 1,200 dpi (enhanced to 2,400-by-2,400 in software) and features a built-in transparency adapter. For presentations and less demanding DTP chores, the Vista-S6 Pro (\$1,045 list, \$899 street) is a general-purpose 24-bit scanner with 300-by-600 resolution, interpolated up to a claimed 4,800-by-4,800. A similar package, the UMAX Vista-S6 LE (not reviewed here), sells for about \$799 and delivers a software bundle aimed at those who plan on doing more OCR work than image editing.

Both of the reviewed packages come with Adobe Photoshop for Windows 2.5, and an image-effects package, Kai's Power Tools SE. The scanners come with different Twain driver modules but both have MagicMatch software, which lets you calibrate the scanner to your monitor and output device.

The less sophisticated Twain driver of the Vista-S6 Pro provides brightness, contrast, scan mode, resolution, scaling, gamma curve adjustments, and a variety of filters including blur and

sharpen. There are also handy eyedropper tools for the highlight and shadow controls, which you can set using a histogram display. Maximum resolvability from the Vista-S6 Pro (284 lpi horizontal, 361 lpi vertical) was below average for our test group, but on a par with others in its class. We found its automatic settings a bit on the dark side for both color and black and white. But image detail was excellent and

there was no noticeable posterization, which indicates that the image could be improved without a loss of details.

The Twain driver for the PowerLook adds halftone and midrange settings on the histogram. You can also selectively control the red, blue, and green channels. The PowerLook's gray-scale scans were also a bit dark, but the overall brightness on the color image was much better, and it did an excellent job balancing the red and magenta tones. Resolvability was an excellent 508 by 559 lpi.

The two scanners were nearly identical in terms of scan speed on our tests, though at about 2.5 minutes for the color scan and half a minute for gray scale, they lagged behind most other units.

Graphic artists will find that the PowerLook gives them more control over the scans—as well as higher resolution and greater color depth—making it the choice for more sophisticated requirements. The Vista-S6 Pro has a competitive price and is well worth consideration as a general-purpose color scanner. Business users looking for mostly OCR and not heavy image editing should consider the Vista-S6 LE bundle. □

► **UMAX PowerLook PS 2400X.** List price: \$3,495. **UMAX Vista-S6 Pro.** List price: \$1,045. Options for both units: Automatic document feeder, \$495; transparency adapter, \$595. UMAX Technologies Inc., 3353 Gateway Blvd., Fremont, CA 94538; 800-562-0311, 510-651-8883; fax, 510-651-8834.

Circle 471 on reader service card

Q: What's the best value
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A: Reprints, of course!

COLORADO TAPE BACKUP



Put all your old records on tape.

TAPE BACKUP ISN'T ONLY FOR PROTECTING YOUR new critical data. Old records are important, too!

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brand systems are the number one choice of old record and recorders alike!

There's a quality (now ISO-9002 certified) Colorado Jumbo solution waiting for you:

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- **NEW!** Jumbo 700, up to 680 MB*
- **NEW!** Jumbo 350, up to 340 MB*
- Jumbo 250, up to 250 MB*
- **NEW!** Jumbo 350 Upgrade kit, for converting your Jumbo 250 to a Jumbo 350.
- Colorado certified tapes, full-featured software for Windows and OS/2* and plug-and-play external

**NEW
RELEASE**

QIC-3010 / QIC-3020 DRIVES

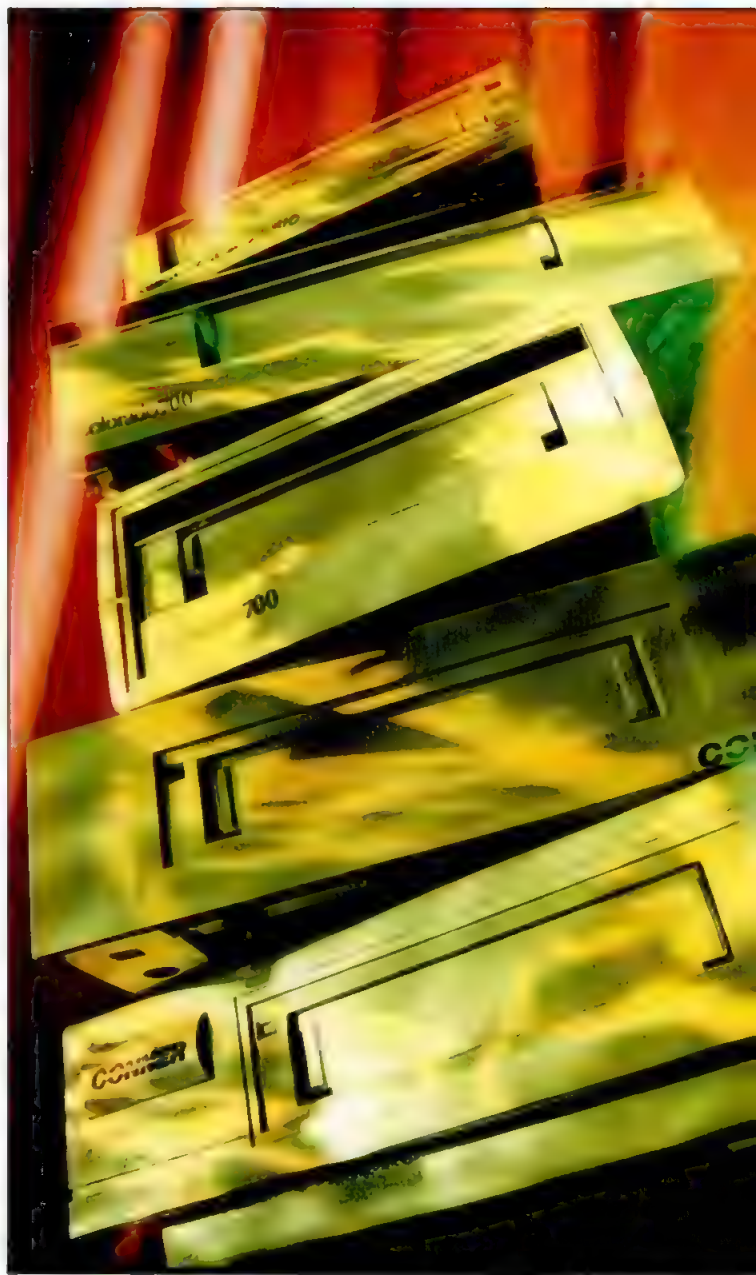
The Bigger Backup

Today's hefty hard disks demand hefty backup solutions. We review six minicartridge tape drives that offer up to 680MB or 1.3GB per cartridge.

By M. David Stone

If you can remember backing up your hard disk to floppy disks, then you can probably remember when a 20MB hard disk seemed like a tremendous amount of storage. Falling hard disk prices and growing data and program file sizes have raised storage requirements by leaps and bounds. Entry-level systems now come with 420MB or even 540MB hard disks, up from 340MB just last year.

Until recently, minicartridge tape drives conforming to the QIC-80 (pronounced "quick 80") standard developed by the Quarter Inch Cartridge Standards Committee were an ideal solution for backing up a personal desktop system, providing 125MB of uncompressed data storage and up to 250MB compressed storage per cartridge. Dominating the personal backup market, QIC-80 drives became bargains, selling for as low as \$150, with QIC tape cartridges selling for only \$12 each. Today's bigger hard disks demand heftier backup capabilities, however, and the QIC committee has responded with the new QIC-3010 standard, which holds at least 340MB of uncompressed data (680MB compressed) on a single 3.5-inch mini tape cartridge, and QIC-3020, which holds 680MB uncompressed (up to 1.3GB compressed). In this review we examine



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the first six QIC-3010 and QIC-3020 drives on the market from Colorado Memory Systems, Conner Peripherals, Exabyte Corp., and Iomega Corp.

Most users know that hard disks have become much more reliable in recent years, but don't be fooled: Backing up your hard disk is as crucial as ever. Remember, first of all, that the "mean" in a mean time between failures (MTBF) rating refers to an expected average; some drives will last longer, others will fail sooner. And while your disk may be built to last, you can always fry the drive with a power surge, scramble file allocation tables with a misbehaved program, or accidentally delete a file, then reuse the disk space before you realize the file is gone.

WHY QIC?

As discussed in the accompanying sidebar "Alternative Backup: Different Strokes, Different Strikes," there are several technologies you can use for backups, including tape, magneto-optical drives, and even removable hard disks. And within each technology, you have more than one choice of format.

Tape is the preferred medium for

backing up a single workstation or standalone system because it is durable and inexpensive. For example, a typical street price for a 125MB-capacity tape minicartridge is roughly \$12, or about 10 cents per megabyte. Current QIC-3010 media costs about \$30, or \$0.09 per megabyte.

QIC cartridges come in two physical sizes: full-size data cartridges (about the size of an old eight-track tape), and the more popular minicartridges, which measure 0.6 by 3.2 by 2.4 inches (HWD). The minicartridges are often called DC2000 cartridges, even though the actual cartridges may have other designations, including DC2120, DC2500, and MC3000XL.

QIC-80 and the older, less hefty QIC-40 drives (60MB uncompressed, up to 120MB compressed), both minicartridge formats, accounted for 49 percent of all tape drives shipped in 1992 and 58 percent in 1993, according to Freeman Associates, a market research firm based in Santa Barbara, California. The projected figure for 1994 is 61 percent. Of the two drive

types, QIC-80 is the more popular, thanks to its greater capacity and a street price as low as \$160.

More recently, Sony introduced its QIC-Wide format cartridge, which uses a slightly wider tape—0.315 inches rather than 0.25—to boost the uncompressed capacity of a QIC-80 drive to 210MB. Be aware, however, that QIC-Wide drives can use standard QIC cartridges, but standard QIC drives can't use the QIC-Wide format. And note too that, for the moment at least, Sony is the only company producing QIC-Wide cartridges, so there is no direct competition to push prices down. QIC-Wide cartridges currently sell for about \$45 for a set of two.

An alternate strategy for increasing drive capacity is 3M's new, even longer extended-length tape, which boosts QIC-80 drives to an uncompressed 175MB. Alas, a 175MB capacity, or even the 210MB QIC-Wide capacity, will still leave you swapping cartridges if you need to back up a 500MB drive. This is not some-

Our Contributors: M. DAVID STONE is a contributing editor of *PC Magazine*. LEON ERLANGER was the associate editor in charge of this story, and MICHAEL J. ZULICH was the project leader.

HIGHLIGHTS

Tape Backup

PROTECTION is important, but fewer than 10 percent of the PC users actually bother to back up the data on their hard disks. So if something were to happen—an accidentally overwritten file or directory, a power surge—most users would be out of luck. Tape backup is easy, reliable, relatively quick, and (most important) inexpensive.

AS HARD DISKS increased in capacity, drive makers, media manufacturers, and the QIC Committee have come up with the current generation of QIC-3010 and QIC-3020 drives. The 3010 drives accommodate up to 340MB of uncompressed data (up to 680MB compressed); 3020 tapes can hold 680MB (up to 1.3GB compressed).

QIC-WIDE is a new, wider-format tape cartridge from Sony that boosts QIC-

3010 capacity to 425MB uncompressed. Only Conner presently offers QIC-Wide-compatible drives.

THE OTHER DIFFERENCE between 3010 and 3020 drives, besides capacity, is speed. The 3020 tape systems support a transfer rate of up to 2 Mbps (or 15MB per minute) versus just 1 Mbps for 3010 units. If you plan to make backups often, the time savings could make the slight price premium for a 3020 drive worthwhile.

ALL THE UNITS we tested featured hassle-free installation and easy-to-use backup software. The times on our tests were also closely grouped in each drive category: It generally took about 80 minutes for a 3010 drive to back up 225MB of data (about 3MB per minute) and 45 minutes to restore it

(5MB per minute). The Exabyte 3020 drive, with a 2-Mbps accelerator card, almost halved those times.

ANOTHER DECISION you'll have to make is whether to opt for an internal or external drive. The internal packages fit neatly in a drive bay and connect directly to your machine's floppy disk controller. An external version lets you back up a portable computer or lets you move easily from PC to PC—but you'll pay a \$200 premium for the convenience.

QIC TAPE IS A GOOD CHOICE, but it's not the only option. If you need direct access to particular files or the ability to swap large files with other users, a disk-based storage option such as removable hard disks or Bernoulli cartridges might be a better option.

thing you'll want to do, since the backup (including Compare) can take from 2 and a half to 3 and a half hours (or 2.4MB to 3.3MB per minute).

Finally, as we went to press, we learned that Colorado Memory Systems and 3M Corp. plan to propose a new type of data cartridge standard named Travan to the QIC committee. The media, developed by 3M, will be similar in size and shape to DC2000 cartridges but slightly wider on one side and thicker. This new cartridge will boast a capacity more than two times greater than existing cartridges and will conform to QIC-80, -3010, and -3020 standards. Travan drives will also be able to read and write to the standard QIC-3010 and -3020 format cartridges. If it is approved, drives based on Travan technology should be available in the second quarter of 1995.



THE NEXT STEP

Anticipating the need for larger backup capacities for workstations, QIC approved the QIC-3010 standard in 1991 and the QIC-3020 standard in 1993. Both QIC-3010 and -3020 drives use the same DC2000 minicartridge format as QIC-80 and QIC-40 drives, but they depend on a different kind of recording head—called a thin-film magnetoresistive (MR) head—and a higher-capacity tape. Uncompressed capacity is 340MB for QIC-3010 and 680MB for QIC-3020. Note, too, that Conner sells a QIC-3010 drive that uses Sony's QIC-Wide format, for a 425MB uncompressed capacity. Add data compression and even the least of these has enough space to back up an uncompressed 500MB drive.

Both QIC-3010 and QIC-3020 drives are just starting to ship, with more QIC-3010 than QIC-3020 drives available at this writing. Each, in its own way, represents the next step beyond QIC-80. Both QIC-3010 and QIC-3020 drives can read tapes created by QIC-40/80 drives, assuming that the software uses the same logical format (QIC-3020 drives can also read tapes created by QIC-3010 drives). Both drives can plug into a floppy disk controller much as QIC-40/80 did before them, and both will also eventually be available in ATA Packet Interface (ATAPI) versions that can plug into an Enhanced IDE (EIDE) connector in sys-

- **Exabyte EXB-1500**
- **Iomega Tape510**

Capacity, affordability, ease of use, and speed. Those are the attributes you need in a tape backup system, with a dose of reliability thrown in for good measure. On these scores, all the drives we

looked at deliver.

But we feel that the Exabyte EXB-1500 and Iomega Tape510 stand a little ahead of the others we tested. At the leading edge of the new wave of QIC-3020 drives, the Exabyte EXB-1500 (\$399) offers higher capacity and better speed than standard 3010 units for only about \$50 more. As hard disk capacities march steadily upward, it won't be just power users who need to back up a gig or more of data. The Exabyte, with a capacity of nearly 700MB uncompressed or 1.36GB compressed, offers about twice what 3010 drives can offer and was also the quickest unit on our tests. The unit is also completely compatible with 3010 tapes. Other tape drive makers will have 3020 units available as you read this (look for Colorado Memory Systems' Jumbo 1400 and Conner's CTM1360), but in this group, we felt the Exabyte was unsurpassed.

Those with more modest needs could look to Iomega's Tape510 system. With a capacity of 340MB un-

compressed, the Iomega turned in the best times of the 3010 drives on our tests. It comes with Iomega's easy-to-use Backup Plus and lists for a competitive \$349 (external version, \$584).

An honorable mention goes to the Conner TapeStor 850 products. The internal and external units were the only ones in this roundup to support Sony's QIC-Wide format, which delivers an increased capacity of 425MB (uncompressed) per tape. You lose compatibility with other drives (standard QIC-3010 and QIC-3020 drives cannot read QIC-Wide cartridges, but the Conner drives can read and write to the standard format), but at \$349 (internal) and \$529 (external), you don't pay a premium for the extra capacity.

We were also pleased with the performance of the final entries in our roundup, the Jumbo 700 (\$384, internal) and Trakker 700 (\$584, external) from Colorado. The only notable difference between these and the other 3010 bundles is in the software.

tems that support EIDE.

The key difference between the two drive types, other than capacity, is their transfer speed. QIC-3020 drives support 1- and 2-megabit-per-second (Mbps) speeds. QIC-3010 drives, like QIC-80s, support 500-kilobit-per-second (Kbps) and 1-Mbps speeds.

If you have an older computer, the floppy disk controller is almost certainly limited to 500 Kbps, which means you can't connect a QIC-3020 drive unless you upgrade the controller or get a separate accelerator card, offered as an option with Exabyte's EXB-1500. Some floppy disk controllers in newer computers already support a 1-Mbps transfer rate, and 2-Mbps controllers are sure to follow.

REVIEW CRITERIA

For this set of reviews, a drive had to follow the QIC-3010 (340MB) or QIC-3020 (680MB) standard and be shipping by October 1994. We found six drives that met these criteria. Five—one from Iomega and two each from Conner Peripherals and Colorado Memory Systems—are strictly QIC-3010. The sixth, from Exabyte, offers both QIC-3010 and QIC-3020 modes, depending on the controller to which it's connected and the cartridge in the drive. A drive from REXON, the 3010MT, was not able to complete our tests, and REXON was not able to solve the problem in time for this review. Other units that had been announced but were not available in time for testing were an

HARDWARE

Tape Backup

external version of Iomega's Tape510, Conner's CTM 1360, and Colorado's Jumbo 1400 (the last two are 3020 drives).

All but two of the drives were internal versions that connected to a floppy disk controller: Colorado and Conner submitted both internal units and external drives that connect to a parallel port. Only the QIC-3010/3020 Exabyte drive came with a 2-Mbps accelerator card. We tested it both with that card and with the 500-Kbps floppy disk controller standard in our system. List prices ranged from \$349 to \$399 for the internal QIC-3010 drive and up to \$584 for the external QIC-3010. The Exabyte QIC-3020 drive lists for \$399 (\$100 for the accelerator card).

Note that the QIC-3010 and -3020 standards include a logical format that software can follow optionally: QIC-113. All the packages we looked at use software that follows the QIC-113 standard. More important, we didn't find any cases where a drive couldn't read tapes that it should have been able to read. Since we were testing complete packages, we used the software that normally ships with the drive in each case. We left most software settings at their defaults but made sure that the compression and auto-compare features were on, since that is how we would recommend using the packages.

Compression not only fits more data onto a tape, but with a 486-based system can lessen backup time since the processor can compress data faster than the tape drive can accept it. Auto-compare, which does a second pass to compare the recorded information to the original data, roughly doubles the time for a backup but is the only way to ensure that the data is correctly backed up.

Among the QIC-3010-only drives, the time it took for a backup and compare of our 225MB test files ranged from just over 76 minutes for the Iomega Tape510 to about 85 minutes for the Conner TapeStor 850 (or 2.5MB to 3MB per minute). Restore times ranged from about 43 minutes for the Iomega drive to almost 56 minutes for the TapeStor 850 (or 4MB to 5.2MB per minute). The 2-Mbps accelerator card made a big difference for the Exabyte drive in 3020 mode, giving it the fastest time by far: less than 47 minutes for backing up and about 29 minutes for restoring. Note that during the tests, some

of the drives alerted us to errors on the tape, which forced us to rerun the tests. The errors were almost certainly caused by flaws in the tapes rather than any problems with the drives themselves, which helps make the point that an auto-compare is well worth the extra time.

Installation is virtually identical for all the internal drives. In each case, the drive fits into a 3.5-inch bay, but most come with a mounting kit so that you can use a 5.25-inch bay if you prefer. After inserting the drive, you need only connect a power cable and ribbon cable to the floppy disk controller and then install the software.

Note that all of the drives we saw use a male 34-pin connector for the data cable and need a matching female connector on the floppy disk controller's ribbon cable. If your system uses the less-common edge connectors for its floppy disk controller cable, you'll need an adapter that converts between pin and edge connectors.

When you're picking a drive, keep in mind that it's the software that gives a drive package its personality, because it's the software that determines what the package can do. Note too that the Conner, Iomega, and Exabyte drives all came with essentially the same Arcada software under various names. The two Colorado drives both came with Colorado Backup for Windows Lite, which is less feature-rich than the Arcada software. By the time you read this, Colorado will be shipping the full version of Colorado Backup for Windows with its QIC-3010 drives. All drives came with both DOS and Windows versions of software.

Both sets of software share key features. Most important, both the Arcada

and Colorado programs are easy to use—with drag-and-drop interfaces and automatic settings for the most common operations—which is the most critical factor for ensuring that you'll use them. Both also provide the most important features you'll want in any backup software—including the ability to backup complete disks or selected files, restore complete disks or a selection of files, auto-compare backed up data with the original as part of the backup, and schedule backups at specific times.

Colorado Memory Systems

• Jumbo 700 • Trakker 700

ALL REVIEWS BY M. DAVID STONE

Colorado Memory Systems, the current market leader, offers users a choice of QIC-3010 drives: the internal Jumbo 700 (\$384 list and street) and the external Trakker 700 (\$584). Using Colorado's standard-format tape cartridges, both drives claim a capacity of 340MB uncompressed. The company recently introduced its 640MB QIC-3020 drive, the Jumbo 1400, though a production unit was not available in time for this review.

Each 3010 bundle came with the DOS backup software as well as Colorado Backup for Windows Lite, a scaled-down version of the company's \$42 standalone package. The internal Jumbo 700 package contains the drive itself, a 5.25-inch mounting kit, a preformatted cartridge, and a ribbon cable.

The Jumbo 700's performance—81 minutes 30 seconds on the Disk Backup



Colorado Jumbo 700 (left) and Trakker 700.

Imagine knowing your valuable data is always safe from disaster.

Conner's
Tape•Stor™ 420
and Tape•Stor™
850 protect your
entire disk drive
with a single
minicartridge.



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Human error, computer viruses or network crashes can quickly destroy months of work. That's the real world. And, if your data is worth saving, it's worth protecting. Conner makes it easy with new, powerful, high-capacity, cost-effective data protection. Introducing the Tape•Stor 420 and Tape•Stor 850. Today's most advanced tape backup solutions for high capacity disk drives.

Now you can protect your entire disk drive with a

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So call **1-800-6-CONNER** or visit your retailer today. Also, ask about our affordable, high-capacity disk drives. See how Conner is making easy data protection a reality.

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The Storage Answer.

	Tape•Stor 420	Tape•Stor 850
Compressed Capacity*	420 MB with Sony QIC-Wide media	850 MB with Sony QIC-Wide media
Format	QIC 80 & AccuTrak 250	QIC 3010
Read Compatible	QIC 80/40 & AccuTrak 250/120	QIC 3010/80/40 & AccuTrak 250/120
Models	Internal floppy and external parallel port	Internal floppy and external parallel port
MTBF**	100,000 Power on Hours	100,000 Power on Hours
Warranty	2 years	2 years
Software included	Backup Exec for DOS and Windows	Backup Exec for DOS and Windows

*All capacities assume software data compression of 2:1. **80,000 Power on Hours for external models.

Available at: Computer City, CompUSA, Egghead Software, Elek-Tek, Fry's Electronics, MicroCenter, Micro Warehouse and most leading computer retailers.
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CIRCLE 224 ON READER SERVICE CARD

Performance Tests: QIC-3010/QIC-3020 Drives

It was no surprise that the only QIC-3020 drive in this group—the Exabyte EXB-1500—was the fastest in the lot, both when it was running off its optional 2-Mbps accelerator card and off a standard floppy disk controller. Test times for all of the remaining QIC-3010 units were fairly close.

What the Numbers Mean

If, like most users, you will use QIC-3010 and QIC-3020 tape drives to perform automated, unattended backups after working hours, then performance differences of 10 minutes on our tests are inconsequential. When you are shopping for tape drives, other issues, like the ease of use and the quality of features in the included software are much more important than performance.

All the drives except those from Colorado Memory Systems came with some version of Arcada's Backup Exec, which was full-featured and easy to use. The two Colorado drives came with the less-full-featured Colorado Backup for Windows Lite but will be shipping with the full version of the program by the time you read this.

The Exabyte EXB-1500, a QIC-3020 drive, had the best overall performance of the six units we tested, being the speediest drive on all but one test. When coupled with Exabyte's 2-megabit-per-second (Mbps) accelerator card, the drive was nearly twice as fast as the competition.

Our five backup and restore tests showed only minor differences among the QIC-3010 drives. The Iomega Tape510 managed to beat out the others on all but the Single File Restore (10MB) test. Posting a time of 76 minutes 14 seconds on our Disk Backup (225MB) test, it was more than 3 minutes faster than the next-closest 3010 and just a minute and a quarter behind Exabyte's 3020 entry. The Conner TapeStor 850 (internal) posted the slowest score on this test, 85 minutes 8 seconds, but performed on a par with the other 3010 drives on the remaining tests.

Restoring this same 225MB of data required as much as 55 minutes 50 seconds for the internal Conner TapeStor 850, followed closely by the Colorado Jumbo 700 at 54 minutes 53 seconds. The fastest 3010

unit on the Disk Restore (225MB) test was the Iomega Tape510, at 42 minutes 35 seconds.

Across the board, single-file and single-directory backup and restore scores were relatively close. The Iomega Tape510 was the fastest 3010 drive on our Selected Backup (10MB) and Selected Restore (10MB) tests: It posted times of 3 minutes 25 seconds and 2 minutes 14 seconds, respectively, but trailed the field on the Single File Restore test with a score of 5 minutes 38 seconds. Still, differences among the 3010 units were so small as to be almost inconsequential.

Due to errors on some of the tapes, we were forced to rerun certain tests. This highlights the importance of including auto-compare in backup operations. All results shown are based on backups in which no errors were encountered.

How We Tested

We tested all tape systems on a Compaq Deskpro 486/33M with 8MB of memory and a 2.1GB Seagate ST12400N hard disk. The hard disks were formatted using DOS 6.2 and partitioned into three logical drives (C:, D:, and E:), with system software, Microsoft Windows 3.1, and tape backup software installed on the C: drive. The file system that each tape drive used to back up and restore was created with the PC Labs Data Generator (which creates sequential and random files in both binary and ASCII formats) and was installed on the D: drive. The structure of this drive contains multiple nested directories, zero-length files, empty directories, hidden files, system files, read-only files, and several 10MB files. In addition, we used several large TIFF images, Windows 3.1, and Adobe Photoshop. The total file structure was 224,608,256 bytes, as reported by the DOS utility CHKDSK. All restores were performed to the E: drive, which we reformatted before each restore to avoid erroneous data-capacity readings.

We installed the backup software for each tape system using the default settings as suggested by the manufacturer. All software was then manually configured to use data compression and verification.

We performed all tests using the Windows versions of the software. We performed all timings manually with a digital stopwatch. The timings began at the last keystroke to start a procedure and ended when keyboard control was returned. We report times in minutes and seconds.

The **Disk Backup** test measures the time it takes to perform a file-by-file backup of the entire disk's contents.

The **Disk Restore** test measures the time needed to perform a file-by-

file restoration of the contents created during the Disk Backup test.

The **Selected Backup** test measures the time it takes to perform a file-by-file backup of one 10MB directory tree with 335 files.

The **Selected Restore** test measures the time required to perform a file-by-file restoration of the tape's contents after the Selected Backup test.

The **Single File Restore** test measures the time it takes to locate a single 10MB file on the tape and restore it.

Lower scores represent better performance.

Minutes:seconds

Colorado Jumbo 700

Colorado Trakker 700

Conner TapeStor 850

(internal)

Conner TapeStor 850

(external)

Exabyte EXB-1500

(with accelerator card)

Exabyte EXB-1500

(without accelerator card)

Iomega Tape510

	Disk Backup (225MB)	Disk Restore (225MB)	Selected Backup (10MB)	Selected Restore (10MB)	Single File Restore (10MB)
Colorado Jumbo 700	81:30	54:53	3:39	2:11	4:00
Colorado Trakker 700	83:25	45:12	4:15	2:47	4:04
Conner TapeStor 850 (internal)	85:08	55:50	4:02	3:30	4:01
Conner TapeStor 850 (external)	79:36	44:20	3:46	2:14	4:30
Exabyte EXB-1500 (with accelerator card)	46:35	29:22	2:36	1:53	3:40
Exabyte EXB-1500 (without accelerator card)	74:56	39:30	3:03	1:48	4:03
Iomega Tape510	76:14	42:35	3:25	2:14	5:38

(225MB) test and 54 minutes 53 seconds on the 225MB Disk Restore—lagged behind the faster Iomega 3010 drive but was still quite acceptable. On the selected files (10MB) tests, it placed in the middle of the pack: Backup took 3 minutes 39 seconds; restore took 2 minutes 11 seconds.

The Trakker 700 bundle delivers the external drive, one preformatted cartridge, a power cord with a transformer block, and a cable to plug into a parallel port. Installation is trivial: Simply plug in the power cord and cable. A parallel-port pass-through connector lets you attach the drive to the same port as a printer.

The Trakker 700's performance was solidly midrange, at roughly 83 minutes for backing up 225MB and 45 minutes for the full restore. On the Selected Backup (10MB) test, the Trakker 700 was on the slow side—4 minutes 15 seconds for backup and 2 minutes 47 seconds for restore—but not slow enough to be a concern.

These two were the only packages in this roundup that didn't include Arcada's Backup Exec software. Instead, they came with Colorado's DOS backup software and Colorado Backup for Windows Lite, a limited version of Colorado Backup for Windows. Both the Lite and full versions offer the same interface, which is easy to learn and easy to use.

One particularly nice touch is a quick-reference Help window with buttons for bringing up instructions for the most important tasks, including how to start a backup, how to restore data, and how to select files for either. Simply choose the files you need to back up or restore, then drag the drive icon to the tape icon (or vice versa). It's hard to imagine an easier approach.

The Lite version of the software is adequate for single-system backup and served well for our tests. But you may want some of the features found only in the full version: a scheduler for automatic backups, a macro recorder to save a variety of backup routines, a tape library to track backups and archived files, and a housekeeping routine that automatically archives rarely used files. Still other features in the full version include support for backing up network servers (a feature that's also in the DOS program that comes with the drive), assorted utilities (including the ability to unerase tapes),

and extra flexibility (including the option to redirect files to different directories on restore). By the time you read this, Colorado will be bundling the full version of Backup for Windows with both drives.

Both the Jumbo 700 and Trakker 700 provide acceptable backup capability at a competitive price. If you need an external device to back up a portable or more than one system, consider the Trakker 700.

► **Jumbo 700.** List price: \$384. **Trakker 700.** List price: \$584. *FC20 1-Mbps controller, \$70; DT-740 tape cartridge, \$36.* Colorado Memory Systems, a Division of Hewlett-Packard Co., 800 S. Taft Ave., Loveland, CO 80537; 800-845-7905, 303-669-6500.

Circle 444 on reader service card

Conner Peripherals Inc.

● TapeStor 850

If you're more concerned with maximum capacity on each tape than with maximum compatibility with other drives, take a look at the TapeStor 850 from Conner Peripherals. The Conner drive is the only one in this group to support Sony's QIC-Wide format, for a claimed capacity of 425MB. And with a list price of \$349 for the internal drive or \$529 for the external, you don't even pay a premium for the extra capacity. Conner has also entered the QIC-3020 fray with its CTM1360 offering (\$399 list), though we couldn't get a production unit in time for this review.

In addition to the drive itself, the internal TapeStor 850 package includes an already attached 5.25-inch mounting kit and a ribbon cable to connect to the floppy disk controller. Both the internal and

external packages come with one preformatted QIC-Wide cartridge and Arcada's Backup Exec (billed here as Conner Backup Exec, Version 2.0). The program comes in both DOS and Windows versions; we used the Windows version for our tests.

Arcada's Backup Exec or customized versions of it—Arcada Backup 4.0 for the Exabyte drive (not bundled) and Iomega Backup Plus 4.0 for the Iomega drive—offer all the features you're likely to need, including the ability to back up and restore entire drives or selected files, schedule unattended backups, and maintain a catalog on your hard disk of all your backups. You can even restore files to directories different from the ones they came from originally. The Arcada interface all but takes you by the hand to guide you through each task. Choose the Backup button from the toolbar, for example, and the program offers a set of buttons for each step in preparing the backup. Choose the What to Backup button and you'll see a list of drives and a button labeled Select Files. Choose the How to Backup button and you can then pick a predefined set of options that emphasizes Speed or Safety, or you can choose the Customize button and set each backup option to taste.

Performance on our tests was not a strong point for the internal TapeStor 850. On most of our tests, it came in last or close to it. Times for the Disk Backup (225MB) test were about 85 minutes for the backup and 56 minutes for the Disk Restore (225MB)—about 10 minutes slower than the fastest 3010 drive in both cases. The drive was also on the slow side on our Selected Backup (10MB) test: just



Conner TapeStor 850 internal (left) and external.

► **SUMMARY OF FEATURES**

QIC-3010/QIC-3020 Drives

PC MAGAZINE
Editors' Choice Award

PC MAGAZINE
Editors' Choice Award

In alphabetical order by company

■ = YES □ = NO

	Colorado Jumbo 700	Colorado Trakker 700	Conner TapeStor 850 (internal)	Conner TapeStor 850 (external)	Exabyte EXB-1500	Imaging Tape510
List price	\$304	\$584	\$349	\$529	\$399	\$349
Device type/QIC standard supported	Internal/3010	External/3010	Internal/3010	External/3010	Internal/3010, 3020	Internal/3010
Interface	Floppy disk controller	Parallel port	Floppy disk controller	Parallel port	Floppy disk controller	Floppy disk controller
Accelerator card	Optional (\$70)	N/A	Optional (\$90)	N/A	Optional (\$100)	Optional (\$90)
Performance and Compatibility						
Formatted/compressed capacity	340MB, 680MB	340MB, 680MB	425MB, 850MB	425MB, 850MB	680MB, 1.36GB	340MB, 680MB
Rated maximum transfer speed (megabytes per minute)	9.3	9.0	9.5	9.5	9.8	9.5
MTBF (hours, when used x percent of that time)	100,000 @ 20%	100,000 @ 20%	100,000 @ 20%	80,000 @ 20%	100,000 @ 6%	200,000 @ 25%
Software						
Tested package	Colorado Backup for Windows Lite 2.02 (included)	Colorado Backup for Windows Lite 2.02 (included)	Conner Backup Exec 2.0 (included)	Conner Backup Exec 2.0 (included)	Arcade Backup 4.0	Imaging Backup Plus 4.0 (included)
Background operation	■	■	■	■	■	■
Image/Modified image backup and restore	□ □	□ □	■ ■	■ ■	■ ■	■ ■
During file-by-file backup, program copies hidden files, system files, and read-only files	Optional (\$42)	Optional (\$42)	■	■	■	■
Restores hidden files, system files, and read-only files	■	■	■	■	■	■
Allows scheduled backups	□	□	■	■	■	■
Supports LANtastic, Personal NetWare, and WFWG (peer-to-peer packages)	■	■	■	■	■	■
NetWare version supported	2.2, 3.11	2.2, 3.11	2.x, 3.x, 4.x	2.x, 3.x, 4.x	1.x, 3.x, 4.x	2.x, 3.x, 4.x
Media						
Cost of preformatted tape	\$30.99	\$30.99	\$37.95	\$37.95	\$49.00	\$50.00
Supports QIC-Wide format/extended-length minicassettes	□ □	□ □	■ ■	■ ■	□ □	□ □
Service and Support						
Toll-free technical support	■	■	■	■	■	■
Hours (eastern time)	10:00-7:00 M-F	8:00-5:00 M-F	9:00-8:00 M-F	9:00-8:00 M-F	9:00-7:00 M-F	9:00-8:00 M-F
Warranty	2 years	2 years	2 years	2 years	2 years	2 years

N/A—Not applicable: An external drive does not use an accelerator card.

over 4 minutes to perform the backup and 3 minutes 30 seconds to restore.

Performance for the parallel-port version of the drive was average or a little better. The drive took 79 minutes 36 seconds to complete our Disk Backup test and 44 minutes 20 seconds for the Disk Restore.

Even the slower times of the internal TapeStor 850 don't rule it out as a reasonable choice. Keep in mind that you'll generally back up as an unattended operation and only rarely restore an entire drive. A 10-minute difference in an unattended operation that takes over an hour simply isn't that significant. For most users, the extra 75MB to 80MB capacity for QIC-Wide format will be much more important.

► **TapeStor 850.** List price: Internal, \$349; external, \$529; QW3010XLF tape cartridge, \$37.95. Conner Peripherals Inc., Conner Tape Products Group, 1650 Sun-

flower Ave., Costa Mesa, CA 92626; 800-626-6637, 714-641-1230; fax, 714-641-2590.

Circle 445 on reader service card

Exabyte Corp.

PC EDITORS' CHOICE
EXB-1500

As the only QIC-3020 drive in this overview, the Exabyte EXB-1500 automatically has some advantages over most of the competition. Most notably, it offers the highest capacity—an unformatted 700MB—as well as the fastest performance. Not surprisingly, it also has the highest price for an internal drive:

\$399 without an accelerator. The extra capacity this Editors' Choice honoree offers, though, should be worth the \$50 premium. Exabyte also offers a 2-Mbps accelerator card for \$100. We tested the EXB-1500 with a standard floppy disk controller and with the accelerator card.

The Exabyte drive follows both QIC-3010 and QIC-3020 standards. Cable it to a 500-Kbps floppy disk controller or plug in a cartridge formatted for QIC-3010 and



Exabyte EXB-1500.

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Valentin Gonzalez, Pfizer

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Tony Chen, DeAnza Systems

"We were working on a state bid when the power went off. APC saved the day and year and future...about 800 pages of data saved thanks to APC."
Ravi Iyer, Software Galleria

"A power surge did significant damage to all of our systems except those protected by APC. The APC units were undamaged..."
C. Jeffrey, C. Jeffrey Eng.

"APC has virtually eliminated downtime in our corporate network..."
Kurt Roemer, Searle Corp.

"Power went out while processing payroll! If not for APC we would have had a walkout!"
Suzy Higginson, OSI Inc



Home office user Don Trux knows first hand about APC reliability. "It ought to be against the law to buy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked."

"APC lets me sleep better at night. How much would you pay to get back that one file you worked all day to complete for the boss who gets on the plane at 8:00 a.m? You should assume that you'll buy a UPS, not that it's some luxury item."
R. Morella, Westinghouse

"A power surge wiped out the FAT tables on all PC's not protected by APC. Now have APC installed on all..."
Craig Post, Comm. Tech.

"Before I purchased the UPS I had to put in at least two hard drives at \$1000. With APC products...no new hard drives in two years!"
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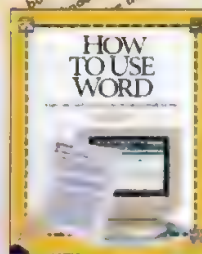
1-800-688-0448,
ext. 259 for more information.

How to Use the Mouse in Windows

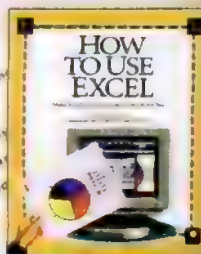
A mouse is a means of giving instructions to the computer. You're probably familiar with the keyboard as the most common input device. A mouse, so named for its hunched over appearance and tail-like cable, is a hand-held input device that along with the keyboard is one of the two input devices most people use to get by without a mouse and do all your work from the keyboard, it's not too wise. The Windows interface was designed with the mouse in mind; it's not always easy to find out what they are. Take a few minutes to learn the major mouse moves and you'll reward yourself with smoother computing.

TIP SHEET

Unless told otherwise, use the left mouse button. The other mouse buttons are used so infrequently that when they are used, they are always told about it.

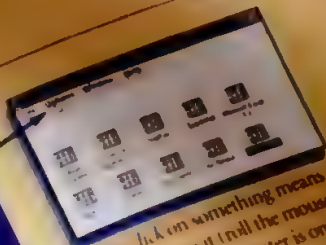


ISBN: 184-6
Price: \$17.95



ISBN: 185-4
Price: \$17.95

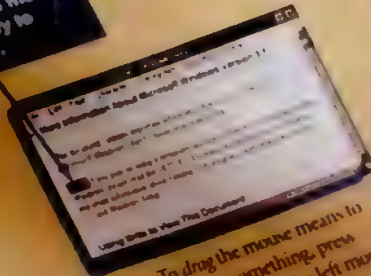
To pull the Options from click command. To the mouse button, clicking a command, click outside the mouse.



2

To click on something means to point to it (roll the mouse so the mouse pointer is on top of it) and then press and instantly release the left mouse button. To double click on something means to point to it and then click the left mouse button twice in rapid succession.

Drag across a word to select it. Then press the Delete key to delete it.

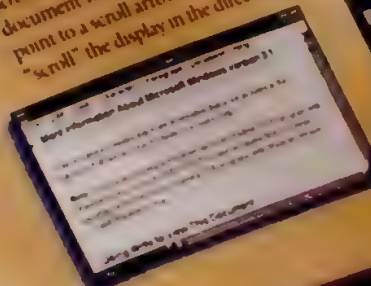


3

To drag the mouse means to point to something, press and hold down the left mouse button, roll the mouse, and then release the mouse button. For example, you can "select" a block of text for deletion by dragging from one end of the block to the other.

4

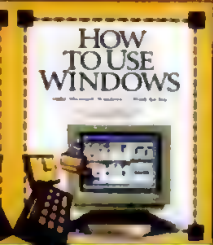
Scrolling is one of the most common mouse actions. When a document window cannot accommodate all its contents at once, point to a scroll arrow and hold down the left mouse button to "scroll" the display in the direction of the arrow.



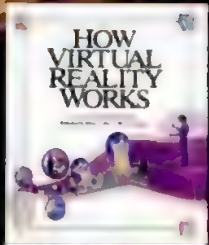
Point here and hold down the left mouse button to scroll down through the document.



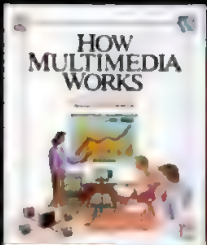
Another way to scroll is to drag the scroll button to a new position along the scroll bar. The position of the scroll button suggests what part of the contents you are viewing.



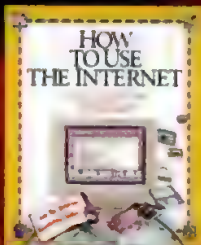
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CIRCLE 377 ON READER SERVICE CARD

Tape Backup

it runs in QIC-3010 mode. Cable it to a 1- or 2-Mbps controller and it runs in QIC-3020 mode. We tested it in QIC-3020 mode at both 1 and 2 Mbps.

The drive package includes an attached 5.25-inch mounting kit, one cartridge preformatted for QIC-3020 mode, a ribbon cable to connect to the floppy disk drive controller, a power cable extender, and software. (We tested our drive with Arcada's Backup Exec, described in the preceding review of the Conner Peripherals drives; the actual software that will ship with the drive was not yet determined at press time.) These should fulfill all your backup needs. For this review, Exabyte also supplied its 2-Mbps accelerator card (the card requires an 8-bit slot).

With the 2-Mbps accelerator card, the Exabyte's performance was far in front of the pack on our 225MB test files: less than 47 minutes for Disk Backup and less than 30 minutes for Disk Restore. Times for the selected files (10MB) tests were also fast—2 minutes 36 seconds for the backup and 1 minute 53 seconds for the restore—but not so much faster that the difference would matter much in real-world use. When tested with the floppy disk controller (rather than the optional 2-Mbps accelerator card), the drive was still the best performer: It needed about 75 minutes for the 225MB backup and less than 40 minutes for the restore. It took only 3 minutes 3 seconds for the 10MB backup and 1 minute 48 seconds for the restore.

In this group, the EXB-1500 is the tape drive of choice for speed and capacity.

► **EXB-1500.** List price: \$399; 2-Mbps controller, \$100; Exatape MC3000XL, \$49. Exabyte Corp., 1685 38th St., Boulder, CO 80301; 800-392-2983, 303-442-4333; fax, 913-492-2465.

Circle 446 on reader service card



Iomega Tape510.

Iomega Corp.

EDITORS' CHOICE
Tape510

The Tape510, from Iomega Corp., could serve as a model for what to expect in a typical QIC-3010 drive: It's an internal drive, strictly QIC-3010 with a capacity of 340MB, doesn't use QIC-Wide format, and comes with Arcada's Backup Exec software (renamed Iomega Backup Plus). It's the fastest QIC-3010 drive in the group, and at \$349, it's also a good value. An external parallel-port version, ideal if you need to back up several machines or a portable computer, lists for \$584.

In addition to the Arcada software (which is described in the Conner Peripherals review), the Tape510 comes with a separate 5.25-inch mounting kit, one preformatted cartridge, a power-cable converter for the mini connector on the drive, and a ribbon cable to connect to the floppy disk controller. Like the other reviewed drives, installation was hassle-free.

The Tape510 backed up our 225MB file in just over 76 minutes and took about 42 minutes to restore. That's 3 minutes faster for the backup and almost 2 minutes faster for the restore than the next-fastest 3010. The Tape510 completed our 10MB test files in 3 minutes 25 seconds for the backup and 2 minutes 14 seconds for the restore, again the fastest 3010.

As we noted elsewhere in this overview, the difference between the fastest and slowest of the QIC-3010 drives isn't enough to matter much in real-world use. But a little speed is always nice to have, especially at such a competitive price. Iomega's Tape510, one of our Editors' Choice recipients, is a solid package for those looking for a 3010 unit.

► **Tape510.** List price: \$349; Iomega Tape510 tape cartridge, to be announced; cartridge 3-pack, to be announced. Iomega Corp., 1821 W. Iomega Way, Roy, UT 84067; 800-777-6654, 801-778-1000; fax, 801-778-3748.

Circle 447 on reader service card

VB Power



ISBN: 1-56276-073-4
Price: \$34.95

This innovative guide by Dan Appleman turns Visual Basic programmers into power users by illuminating the tools of the Windows Application Program Interface (API). Includes a time-saving disk that contains source code from the examples in the text, plus a specially designed dynamic link library (DLL).



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ALTERNATIVE BACKUP

Different Strokes, Different Strikes

Backup solutions include a variety of tape and removable drive options, but each has its particular strengths and weaknesses.

By M. David Stone

Although minicartridge QIC-3010 and QIC-3020 tape drives are both excellent choices for backing up a single workstation, they are far from the only choices. We collected representative samples of a range of alternatives—lower-capacity minicartridge drives, a full-size cartridge tape drive, a DAT (digital audio tape) drive, an 8-mm tape drive, a CD—recordable drive, a magneto-optical drive, a removable hard disk, and two removable cartridge disk drives—and ran some informal tests to gauge the pros and cons of each solution. These alternatives differ (sometimes considerably) in capacity, cost, and performance and are tailored to the needs of different market segments. Determine what your requirements and budget constraints are and choose accordingly. Keep in mind, too, that we tested only one example of each technology; other units may show better or worse performance.

HEAD TO HEAD: TAPE VS. DISK

The technologies we compared for this feature fall into two broad categories: sequential and random access. *Sequential backup*, for all practical purposes, means tape. *Random access backup* generally translates to some form of disk-based

recording medium: floppy, hard, removable hard, magneto-optical (MO), or CD—recordable disk.

The principal advantage of a disk-based solution for backup is that if your system disk crashes, you're still in business. If you can boot up your system or use your backup disk on another computer, you can run programs and read data directly off the backup disk. Disk solutions are also most appropriate if you're looking for near-line storage of files (usually large desktop publishing, graphics, or CAD/CAM files) that you don't want to store on your main system hard disk. And they are more useful than tape for exchanging large files with other users.

All you need to do when you receive a disk is put it in the appropriate drive. You can then access your files directly or copy them to your system disk with a DOS Copy command or Windows File Manager. To use files stored on tape you have to launch a tape backup application, activate the Restore function, then wait while the drive winds the tape to get to the files you need and restores them to your hard disk. If you need a disk-based solution for near-line storage or exchanging files, it will often make sense to use the same drive for backup also.

Tape's biggest advantage is inexpensive media. Even at the relatively expensive price of \$30 per tape for a QIC-3010 drive, for example, the cost for storing

340MB is a reasonable \$0.09 per megabyte. Street price for a 2GB DAT tape is \$12 or less—just over a half cent per megabyte. Disk-based storage, on the other hand, ranges from \$0.17 to \$0.70 per megabyte, except for CD—recordable media, which is only \$0.02 per megabyte but actually works out to more when you consider that data stored on a CD—recordable disk cannot be overwritten. If you require merely an inexpensive backup capability in case of emergency, or if you want to archive files that you plan to delete from your hard disk, then you probably want some type of tape drive.

A second advantage for tape is high capacity. For maximum convenience, you'll want the ability to fit at least one full backup of your hard disk on a single cartridge. These days, that's at least 340MB and could go as high as a gigabyte or more. Most families of tape drives offer one or more drives with such capacities. Most varieties of removable disk-based storage, in contrast, offer less than 300MB per disk. Few go as high as 600MB.

TESTING TAPE AND DISKS

We limited our informal tests to a single backup operation. Where possible, we backed up the entire 225MB data set that we used for the QIC-3010 and QIC-3020 drives, and we set the software to compare the data on tape to the original as part of the backup operation. For pack-

ages that couldn't fit 225MB on a single tape or disk, we used a 100MB subset of the test data.

Our results provide a point of reference for comparing the speeds of the different technologies. But keep in mind that they are no more than that. All drives that follow a given specification will offer similar performance. But different drive types within a given family have different specifications and different transfer rates.

Hardware installation is essentially identical for most of these drives. Except for minicartridge drives, all the internal drives require a 5.25-inch, half-height bay. The overwhelming majority use a SCSI-2 interface and either come with their own SCSI cards or can plug into a standard SCSI adapter. This of course means dealing with all the headaches usually associated with SCSI, including setting IRQs, base memory addresses, and DMA channels for the SCSI card, assigning SCSI IDs for the various devices, and so on. Not to mention incompatibilities that may arise between SCSI cards and devices.

Tape Options

Once you've decided that tape storage best fits your needs, further choices depend on the size of your system hard disk and whether you're willing to spend the

extra money for top-notch performance. Generally you'll want media with enough capacity to back up your entire hard disk. Many of the solutions we tested are most appropriate for network storage, but if you work with a lot of large desktop publishing, CAD/CAM, or multimedia files, you may require hefty storage capacities.

MINICARTRIDGE QIC-80 DRIVES

With a formatted capacity of 125MB uncompressed (175MB with extended-length tape or 210MB uncompressed with QIC-Wide media) and as much as twice that compressed, QIC-80 drives are one step down from QIC-3010 drives and suitable for backing up smaller hard disks or a larger hard disk that you've divided into partitions. They are also somewhat less expensive; typical street prices are \$150 to \$370 for the drives and can go as low as \$12 for 125MB cartridges, or 10 cents per megabyte. We looked at one standard QIC-80 drive—Colorado Memory Systems' Jumbo 250 (\$190 list, typically \$159 street price, with a \$39.95 upgrade kit available for supporting 170MB tapes)—and one drive that was capable of using QIC-Wide cartridges—Conner Peripherals' TapeStor 420 (\$199 list, typically \$175 street price). Somewhat surprisingly, the Jumbo 250 couldn't fit the entire 225MB data set on one 125MB tape, even with

maximum compression. The TapeStor 420, with its greater capacity, had no problem fitting our test data on the tape. Performance for each was on a par with QIC-3010 drives.

CARTRIDGE QIC DRIVES

If you need more storage capacity than a QIC-3010 or -3020 drive can offer, consider a full-size QIC drive. Full-size data-cartridge QIC drives offer uncompressed capacities that range from a modest 60MB all the way up to 5GB. Notable drive makers in this area include Tandberg Data and REXON.

We looked at a QIC-2GB drive: Tandberg Data's internal Panther 2500. This unit, with a list price of \$1,300 (\$975 street), offers an uncompressed capacity of 2.5GB per cartridge. Prices for the 0.6- by 4- by 6-inch (HWD) cartridges range from \$44 for a 250MB cartridge up to roughly \$49 for the highest capacity of 2.5GB—or about \$0.02 per megabyte. If your storage needs will be high enough—for example, if you plan to use the drive for archiving large numbers of files—the low price per megabyte may be more important than the high price of the drive for determining total system cost.

All full-size cartridge drives with 1GB or greater capacity use a SCSI-2 interface. Note that full-size cartridge drives (as well as DAT and 8-mm drives) have a built-in



Tape Options (from left to right): Colorado Memory Systems Jumbo 250 (DC 2000 minicartridge), Hewlett-Packard JetStore 2000 (DAT), Tandberg Data Panther 2500 (DC 6000 full-size cartridge).



Disk-Based Backup: Left, Iomega Bernoulli 230 (removable cartridge); center top left, Maxtor MobileMax 171 (removable PCMCIA hard disk); center top right, Fujitsu DynaMO 230 (MO); center bottom, Philips CDD 522 (CD-R); right, SyQuest SQ3270S (removable cartridge).

compare—a read-after-write step—while writing data. This all but eliminates the need for a separate compare for routine backups, though you should still use a compare, for maximum safety, when backing up critical data. On our tests, the drive managed 31 minutes for the 225MB backup by itself and 50 minutes with the compare. This is faster than the QIC-3010 drives but significantly slower than the DAT or 8-mm drives.

DAT DRIVES

DAT drives offer both faster speed and higher capacity than QIC drives. Uncompressed capacities for the various drive types in this family are 2GB and 4GB, and street prices range from \$800 to \$1,700 for the drives and \$7 to \$19 for the cartridges. That works out to less than one cent per megabyte.

The advantage of a DAT drive for both speed and capacity grows out of its helical scan recording scheme. Briefly, the path for the recording head takes the form of a partial helix in relation to the tape and produces a track that is laid down as a diagonal slash. This approach uses the tape more efficiently than QIC drives, which record data in parallel tracks along the length of the tape.

For this overview, we looked at the ex-

ternal version of the 2GB Hewlett-Packard JetStore 2000, which has a list price of \$1,414 and a typical street price of \$1,130. (Other major vendors of DAT drives include Conner, IBM, Sony, and WangDAT). The JetStore 2000 uses a SCSI-2 interface. It came without bundled software but worked without problems with Colorado Backup for Windows. We timed it at about 19 and a half minutes for backing up 225 MB, and about 41 minutes complete with the compare.

8-MM HELICAL SCAN DRIVES

As the name implies, 8-mm helical scan drives take advantage of the same helical scan recording scheme as 4-mm DAT drives. However, they use different specifications and a wider tape to offer still better speed and capacity. Exabyte Corp., the only company that makes 8-mm drives, provided its external version of the EXB-8505XL. At 7GB uncompressed per tape, the EXB-8505XL is overkill for backing up a standalone system. Other Exabyte 8-mm drives offer capacities of 2.5, 3.5, and 5GB. Street prices range from \$1,400 to \$2,500. Media cost is about \$8 to \$9 for a 5GB cartridge, or an impressively low \$0.002 per megabyte.

The Exabyte drive uses a SCSI-2 interface. We tested it with NovaBack for

Windows 2.01 (\$149 list price), from NovaStor Corp. (818-707-9900). As you might expect for a unit priced this high, the Exabyte was the fastest tape drive in the batch, at 12 minutes for backing up 225MB and under 26 minutes complete with a compare. Exabyte says that its lower-capacity drives offer roughly half this performance.

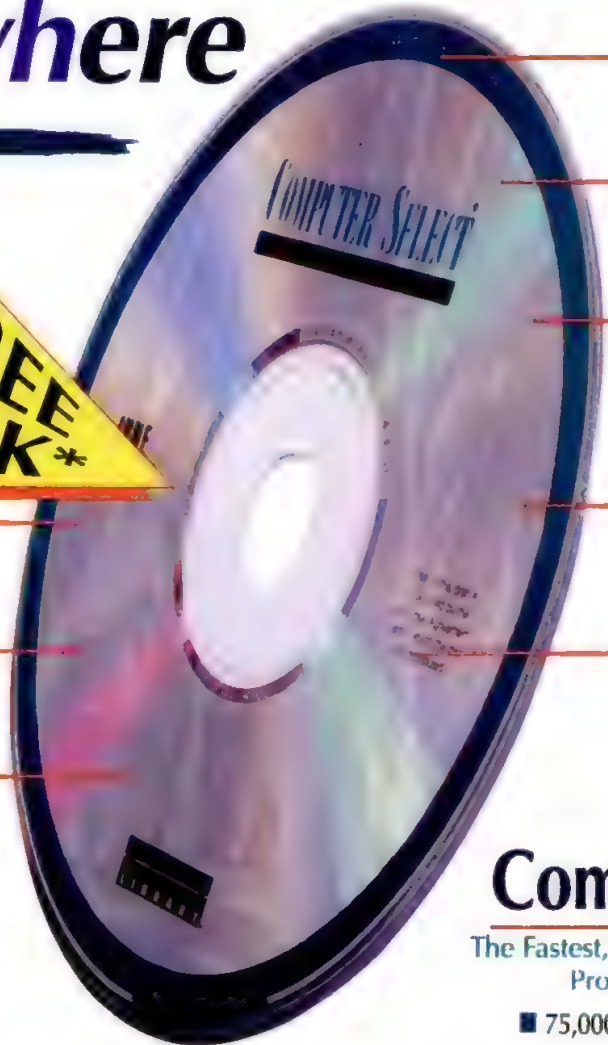
Disk-Based Backup

All but one of the disk-based drives we looked at share one key feature: They behave essentially like a very fast floppy disk drive. We took advantage of this by using the DOS XCOPY command for backup. The exception is the CD—recordable unit, which doesn't look like a standard disk drive to DOS and requires its own software. Functionally, the drives fall into three categories: removable cartridges, removable drives, and CD-R.

REMOVABLE CARTRIDGES

The three drive types in the removable-cartridge category include magneto-optical drives with removable disks and two proprietary drive types: a SyQuest drive that uses a hard disk in a removable cartridge, and Iomega's Bernoulli drive, which uses a floppy disk in a removable

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CIRCLE 158 ON READER SERVICE CARD

cartridge. Unlike removable hard disks, removable cartridges do not hold the drive mechanism.

Despite the different technologies, all three drives offer capacities of more than 200MB, which makes them suitable for essentially identical purposes: near-line storage, exchanging large graphics and multimedia files with other users, and providing backups in random access format. Their key differences lie in performance and price.

Magneto-optical drives come in 5.25- and 3.5-inch formats and in various capacities; a 3.5-inch, 230MB version was most appropriate for our purposes. For this overview, we looked at the external version of the Fujitsu DynaMO 230, which has a list price of \$1,200 and a typical street price of \$900. The internal version is about \$100 less. More generally, street prices for 230MB MO drives range from \$850 to \$900. Other major 3.5-inch MO vendors include Epson and IBM.

In our tests, the DynaMO backed up 225MB in 32.5 minutes, which makes it faster than most tape drives but the slowest in this category. It's also the most expensive for the drive itself. But it offers the lowest cost for disks, at roughly \$40 street price for a 230MB disk, or \$0.17 per megabyte. Given enough disks, the total price will be lower than for a less expensive drive with more expensive cartridges. So if you need lots of disks and performance is less of a concern, an MO drive is a good choice.

Iomega's Bernoulli 230 drives use proprietary floppy disk cartridges. The drive itself is \$547 for the internal version and \$582 for the external, with street prices of \$480 to \$525. The 230MB cartridges typically cost \$100 on the street, which works out to \$0.43 per megabyte—among the highest of all the technologies. In our tests, the drive backed up 225MB in 19 minutes. The relatively low price for the drive makes the Bernoulli an attractive choice if you need few cartridges. The more you need, however, the more likely that total system price will pass the price of an MO drive or SyQuest drive.

The SyQuest SQ3270S drive also uses a proprietary cartridge. The drives themselves are priced at \$789 for the external version, with a typical street price of \$600. Per-megabyte prices for the 270MB car-

tridges (a slightly higher capacity than Bernoulli or MO drives) work out to be about \$0.24, figuring on a \$65 cartridge. The SyQuest drive also proved fastest in our tests, at 14 minutes for backing up 225MB. Besides the performance advantage, SyQuest has an edge for professional graphics users and desktop publishers who need prepress-quality scans and output. A good proportion of service bureaus have adopted SyQuest as the standard,

*CD-R technology is for
people who want to keep
data permanently. With
an expected lifetime of
100 years, CD-R disks
are highly reliable.*

making it a convenient way to shuttle large graphics files from your equipment to theirs.

REMOVABLE HARD DISKS

Removable drives differ from removable cartridges in that you remove the entire hard disk—including the drive mechanism. That makes them more sensitive to rough treatment, and, therefore, unsuitable for exchanging files by mail. It also makes them more expensive, since you have to buy a complete drive for each increment in storage.

High price makes removable drives inappropriate for routine backup. However, you might consider using a removable drive to maintain an up-to-date copy of your primary hard disk, so you can keep working if your hard disk dies. Removable drives can also be useful as a primary hard disk (for data that you want to lock up in a safe overnight, for example) and they can be a convenient way to move large amounts of data between systems.

Removable drives come in several varieties, including, for example, TEAC's TEAC-Stor, a half-height IDE drive available in 250MB, 360MB, and 540MB capacities. Street prices range from about \$240 for the 250MB drive to \$375 for the 540MB drive. For this overview, we

looked at Maxtor's MobileMax 171 hard disk drive. The MobileMax is a 171MB PCMCIA drive with a list price of \$390 and a likely street price of \$315. On our tests, the Maxtor drive managed to back up 100MB in just 4 minutes. This high speed makes PCMCIA hard disks the ideal answer for shuttling large amounts of data between, for example, a notebook and desktop computer that are both equipped with Type III PCMCIA slots.

CD-RECORDABLE

CD—recordable technology is for people who want to keep their data permanently. CD-R drives use a laser to etch information onto a CD-R disk that you can then read in any CD-ROM drive. In fact, you can create CD-ROMs to distribute information, such as a database, within your company, complete with regular updates. Since CD-R disks have an expected lifetime of 100 years, they are also a highly reliable storage medium for archiving or backing up critical data.

CD recorders are available in both internal and external versions, with many of them about the size of a small desktop computer. They typically sell for street prices of \$3,000 to \$8,000 for the drive plus special-purpose recording software, but prices are expected to fall to as low as \$1,500 by mid 1995. Note that they can record multiple sessions, so you can record different versions of the same file on one disk. CD-R disks have a maximum capacity of 650MB and sell for about \$15, or \$0.02 per megabyte. For this overview we looked at Simpli-CD, from Young Minds (Editors' Choice, "Roll Your Own CD," May 17, 1994). Other noteworthy vendors of CD-R packages include CD-Rom Strategies, Dataware Technologies, JVC Information Products, incatsystems software u.s.a., Philips LMS, and Yamaha Corp. of America. The price of the Simpli-CD package we saw, built around a Philips CDD 522 drive and software, is \$5,995 (about \$4,800 street).

On our tests, the CD recorder was the slowest of all the disk-based choices, at 43 minutes for backing up 225MB. But if your data is so critical that you absolutely can't afford to lose it, or if you have to archive data for an extremely long period of time, the reliability of CD-R disks may be of interest. □

Network Edition



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First Looks

► WEB SERVER SOFTWARE

Electronic Businesses

With a PC, some Web server software, and lots of savvy, you too can tap into the millions of users on the Internet. We'll help you pick the software and avoid the pot-holes as you build your on-line presence.

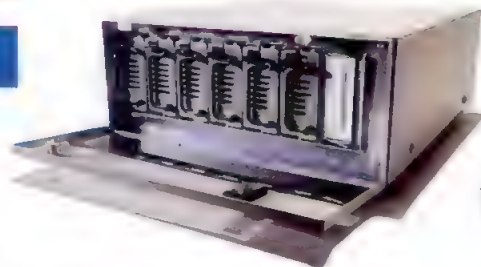
By O. Ryan Tabibian

Your customers are on it and so are your competitors. The World-Wide Web (the Web), once the haven for academia and scholars around the world, has transformed in the past few years into one of the hottest sources of customer support and advertising. Today there are thousands of companies, ranging from bookstores to pizza shops, that offer a variety of services to millions of Internet users.

And the numbers continue to grow at a mind-boggling rate. Each week 200 sites

are added to the thousands of sites that already exist. What was originally a small research project of the European Laboratory for Particle Physics (CERN), which in mid-1992 occupied a mere .02 percent of all Internet traffic, grew to 10 percent of all Internet traffic by October 1994.

Capturing a portion of this audience is a matter of establishing a *home page* on a Web server. The home page is like a billboard introducing the user to the site and its available content. Hyperlinked objects let the user click on a term or phrase and pull up information about that topic. Its rich graphics and increasingly interactive nature make the Web fine for advertising



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and customer support. And with the Web spanning the globe, any company can now easily and inexpensively sell its products across international boundaries (For information on hypertext markup language, see the sidebar "The HTML: Nothing but Net" in the feature "Publishing Without Paper" in this issue. You can learn about Web browsers in "The Web Untangled.")

Establishing a Web server is simple if you're familiar with the Internet. But for the network manager looking to set up a Web server the decisions seem endless. What connections do you need? What kind of hardware do you have to buy? Who do you call to get an Internet address?

We'll tell you here the issues and the answers for setting up that Web presence.

Along the way we look at the commercial Web servers—SCO Computers Global Access for SCO Unix and Netscape Communication's Netsite Communications Server for Solaris 2.3—and beta, public domain versions of hypertext transfer protocol (HTTP) software from CERN and NCSA for Macintosh, Microsoft Windows NT, and Solaris platforms.

We selected these products for their availability and popularity. The public domain servers, along with less popular Web server implementations, are available free via the Internet from either CERN or the National Center for Supercomputing Applications (NCSA). (See the table of vendor addresses later in this article.) If you want customer support and assurance that your Web server will continue to grow in functionality, consider one of the commercial versions of the Web server software from SCO or Netscape. With the growing popularity of these servers you will likely find in the near future an increase in the number of vendors offering commercial versions of Web server software. A number of vendors such as SPRY and Beame & Whiteside Software have announced products that should be available by the time you read this. Netmanage is currently shipping a Windows version of Web server soft-

ware in its TCP/IP package.

What you'll learn here is that the Web server you buy will depend on the type of platform you select and the purpose of your server. Products for the Sun platform, or for PCs running Windows NT or SCO Unix, are best for sites with heavy traffic, while the Macintosh and Microsoft Windows 3.11 versions are suited for sites with little traffic. For ease of use, none of the products can match MacHTTP. This

product, while not suited for sites with heavy traffic, is perfect for experimental servers that are set up locally or even for elementary and primary schools that are teaching pupils about the Internet. None of the products, however, yet offer the security features necessary to

pass around credit-card information, though those standards are in development.

HOOK ME UP!

While setting up a Web server and publishing on the Internet can prove to be taxing, with the right information and solid preparation the process can be quite simple.

Perhaps the easiest approach for many will be to go through an Internet Presence Provider (IPP). An IPP, such as the Unnet Technologies alliance with Intersé, will publish your home page, freeing you from the responsibility and effort of installing and maintaining an Internet connection. Not surprisingly, it is best to use an IPP if you lack in-house expertise and are concerned about up-front costs.

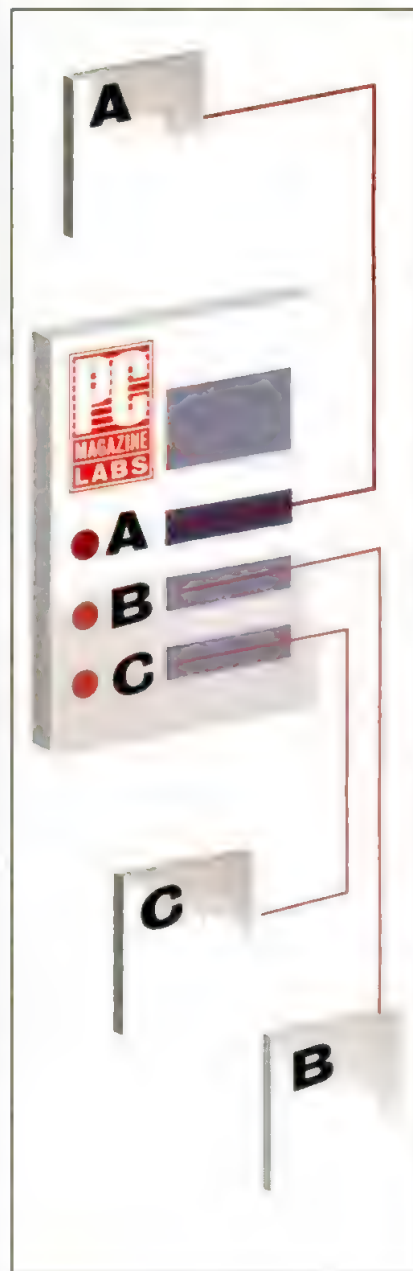
Choosing an IPP also means that the amount of information you're offering is not much more than what appears on a home page. If you plan to offer a full-fledged service, with all the bells and whistles, consider setting up your own server, which is a bit more complicated.

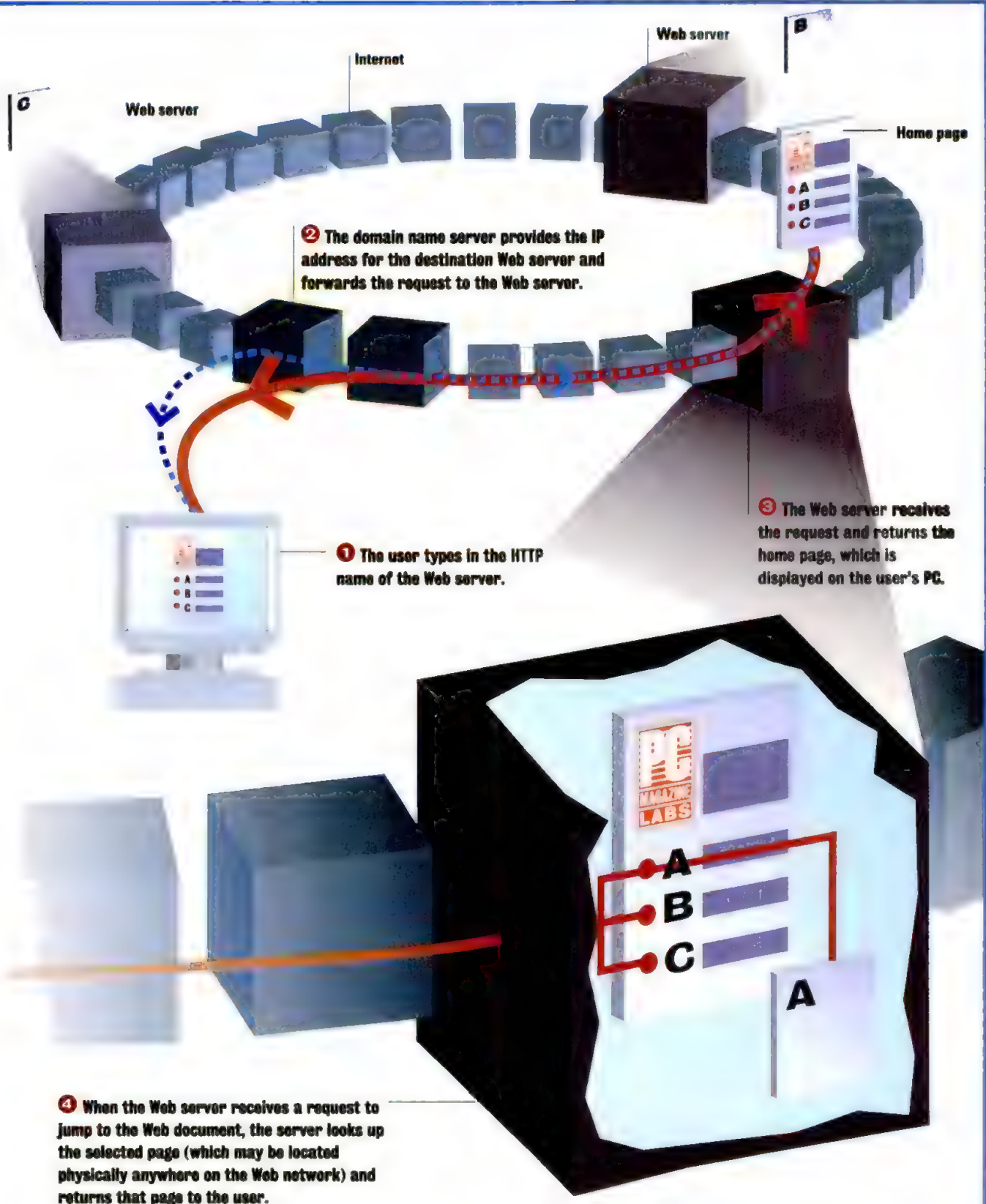
To set up your own server, you'll need to consider four requirements: the link to the Internet, the IP address, the server hardware, and the HTTP server software. A link to the Internet should be your first priority. You can get such a connection

Establishing a Web server is simple if you're familiar with the Internet. But for the network manager looking to set one up, the decisions seem endless.

How Web Servers Work

You can understand how the Web network works from two angles. Logically, Web documents are tied together through hypertext links (below). Physically, Web servers interpret these links, allowing you to view documents from across the Internet (as shown on the right).

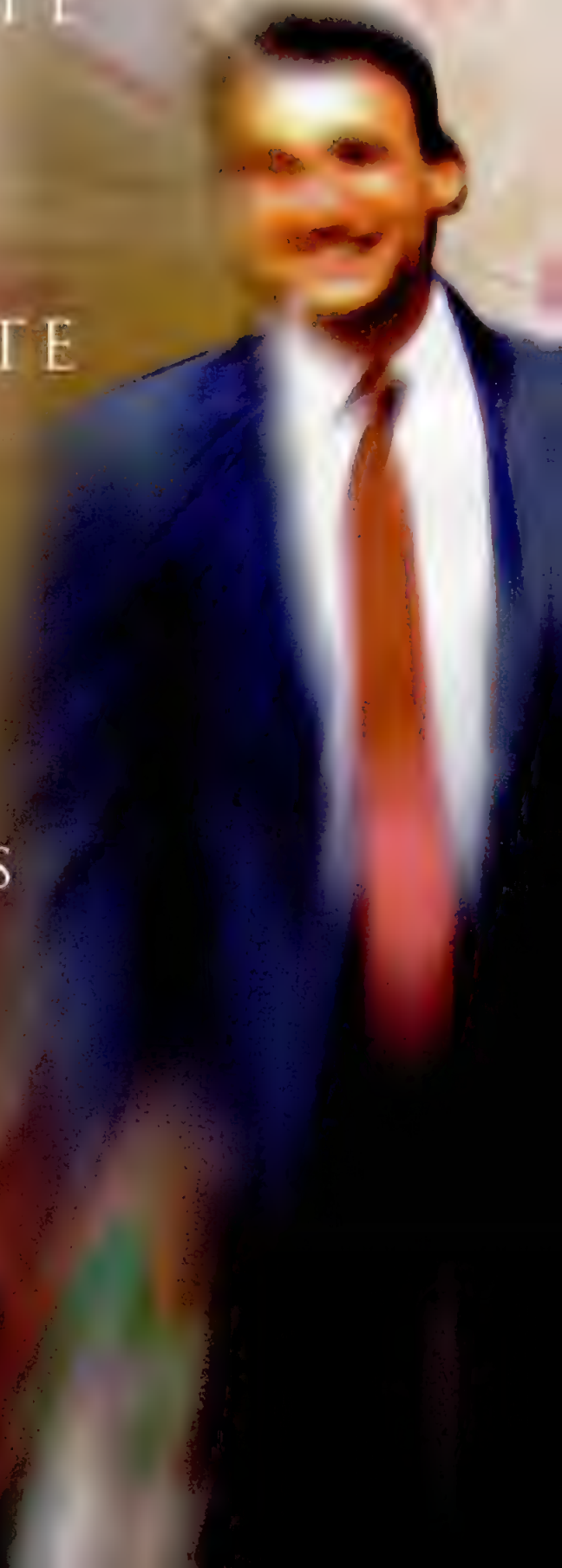




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through an access provider in your area such as Netcom On-Line Communications Services, Performance Systems International (PSI), or Uunet, or go through your local phone company. The link can range from a standard 14.4-Kbps modem line to a full 45-Mbps (T3) line, though in our testing we found 128 Kbps (ISDN speed) to be the minimum acceptable speed.

With the service provider's link, you have the physical connection, but you will still need an IP address. If you're lucky the service provider will also give you more than the one required IP address. If not you'll need to go to the InterNIC, the central authority, which manages the distribution of Internet addresses.

One note about IP addresses: If you really want to distinguish your company on-line consider a domain name like *microsoft.com* or *novell.com*. Domain names are particularly helpful since the general rule of thumb in accessing a company's home page is to use *www* followed by the company name and identifier. For example to access Silicon Graphics, your

command would be *http://www.sgi.com*. The InterNIC will not only assign you a set of IP numbers but will also register your domain name on the Internet. If, however, you don't want to go through the hassle of applying for your own domain name from the InterNIC, you can

servers that are on the Internet use Unix workstations or servers, such as Sun's SPARCstation 20 or the HP Apollo 900/735. But with the proliferation of multithreaded operating systems for PCs with products such as Microsoft Windows NT and IBM's OS/2, along with more

powerful processors and faster bus speeds, your choices are no longer limited to Unix.

You can also choose an all-in-one server solution such as the Netra Internet Server from Sun Microsystems Computer Co. These solutions come pre-installed with Web server software; all that the user needs to do is plug the server into the digital link. The Netra Internet Server is

designed to hide many of the complexities of Unix from the end user. In most cases you can actually set up the server without a monitor, since there are speech capabilities built into the server, which notify you of any problems.

Your platform choice depends on the amount of traffic you expect and the cost. What primarily dictates the type of hardware and operating system that you

Pick Your Web Server

Hits per day	Server size	Minimum server configuration	Software	WAN link type	Estimated minimum costs:	
					WAN link*	Hardware
250,000+ server	High-end	A SPARCstation 20 or an Apollo 9000/735 with 128MB of RAM and a 1GB hard disk	NetSite or other Unix-based Web servers	T3	\$16,496 per circuit and \$45 per mile	\$12,000–\$23,000
100,000–250,000	Midrange	A SPARCstation 5 with 32MB of RAM and a 500MB hard disk, or a dual-Pentium-based PC running Windows NT or SCO Unix with 64MB of RAM and a 500MB–1GB hard disk	HTTP for Windows NT or SCO Global Access	T1	\$2,520 fixed cost and \$3.61 per mile	\$5,000–\$16,000
10,000–100,000	Low-end	A 486- or Pentium-based PC with 32MB of RAM and a 500MB hard disk, or a PowerPC Macintosh with 32MB of RAM and a 500MB hard disk	HTTP for Windows, HTTP for Macintosh	128-Kbps	\$491 per month and 57¢ per mile	\$2,000–\$5,000

* WAN prices are based on MCI telephone rates.

Source: Center for Communications Management Information.

ask your service provider to set up your home page with an alias that corresponds to your company name. An alias is an image of your domain name that is not officially registered but looks like a domain name to the outside world.

After you decide on a service provider and get an IP address, you will then need to choose your hardware and operating system. Currently the majority of Web

■ Essential Web Terminology

CGI shell scripts Simple scripts that let you add features such as search and FTP to your home page.

finger A Unix tool for identifying resources on the Internet.

FTP File Transfer Protocol; the protocol used by most Unix machines to exchange files.

HTML Hypertext markup language; a scripting language used to write World-Wide Web documents.

HTTP Hypertext transfer protocol; the protocol that the Web uses to communicate between clients and servers.

Pearl Script A powerful scripting language used to write Web servers, among other Unix applications.

SGML Standard Generalized Markup Language; a standard for languages used to create documents for on-line services.

S-HTTP Secure hypertext transfer protocol; the next version of HTTP, which should include security.

WAIS Wide Area Information Service; a search engine that can look up information across the Web.

Z39.50 A broad set of standards for conducting searches on the Internet. WAIS is the part of the standard that searches the Web.

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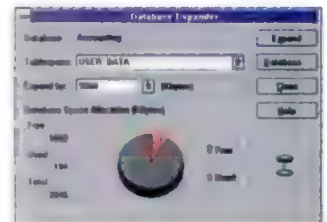
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for a free informational video or details about the following "Proof that you can" Client/Server Forums

San Francisco	Portland	New York	Orlando	Los Angeles	Houston	Wash.DC	Phoenix	Denver
1/31	2/2	2/7	2/9	2/14	2/16	2/23	2/28	3/2

ORACLE

■ Our Top 11 Sites for Building A Web Server

• HUNTING FOR A WEB SERVER?

This site contains information and pointers to all the public domain servers available on the Internet. It's invaluable to anyone looking for the right server software.

<http://info.cern.ch/hypertext/WWW/Daemon/Overview.html>

• WHAT ABOUT A WEB CLIENT?

NCSA's home page is the mother of all home pages. This is a great place to start looking for both clients and servers and also to get extensive information about the Internet.

<http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html>

• NEED GENERAL WEB SERVER INFORMATION?

The World-Wide Web development home page is full of information about all aspects of the Web.

<http://www.charm.net/~web/Vlib.html>

• NEED MORE GENERAL WEB INFORMATION?

This is one of the most comprehensive sites available on the Internet for information regarding the World-Wide Web.

<http://akebono.stanford.edu/yahoo/bin/menu?95.7>

• CURIOUS ABOUT THE SIZE OF THE INTERNET?

The Internet is growing at a *very* fast rate. If you want information on its growth, you should try the Graphics and Visualization and Usability Center home page. The information is up-to-date and even graphical.

<http://www.cc.gatech.edu/gvu/stats/NSF/merit.html>

• LOOKING FOR AN IP ADDRESS?

This home page for InterNIC provides all the information you need to know to get IP addresses for your site.

<http://www.internic.net/>

• HUNTING FOR HELP BUILDING A WEB SERVER?

If you want a server that best fits your needs, you might want to write your own HTTP server. With a little knowledge of C and directions from this page, you are on your way to creating a killer server.

<http://info.cern.ch/hypertext/WWW/Daemon/JanetAndJohn.html>

• WHAT ABOUT HELP ON BUILDING A HOME PAGE?

If you want to write an HTML home page, come to this site. It contains a wealth of information on how to prepare HTML documents—from truly the most basic to the most complex.

<http://www.ncsa.uiuc.edu/demoweb/html-primer.html>

• WHAT ABOUT HELP ON BOTH SERVERS OR DOCUMENTS?

As the address implies, this site contains all the information you will need in setting up your server and creating HTML documents.

<http://home.mcom.com/home/how-to-create-web-services.html>

• CURIOUS ABOUT WEB SERVER SECURITY?

Security, security, security—the three magic words when it comes to the Internet. For information about the various secure HTTP (S-HTTP) implementations and what the status of security on the Internet is, check out this site.

<http://www.commerce.net/software/SshTpd/Docs/manual.html>

• NEED A SPECIFIC HTML DOCUMENT?

If you're looking for an HTML document, be sure to stop here. Simply type in the topic you want to find and the server will return the addresses of home pages on a related topic.

<http://www.biotech.washington.edu/WebCrawler/WebQuery.html>

choose is the type of service that you provide. For example, if you plan to provide technical support for a large number of users, you can expect hundreds of thousands of *hits* per day, which means you probably need to consider a powerful Unix server or workstation. Windows users shouldn't give up hope though. Windows NT, while still a fairly new platform, is starting to prove its muscle. At press time, one of the most popular Web and FTP sites

was www.microsoft.com, which runs on—you guessed it—Microsoft Windows NT Server 3.5. Sites that plan for only a home page with little traffic have more options using Windows 3.11, OS/2, or even Macintosh platforms.

Another factor to consider regarding your choice of platform is cost. The cost of setting up a server goes beyond the price of hardware, which can range from a \$2,000 PC to a \$25,000 SPARCstation 20 and higher. Fully configured Web server

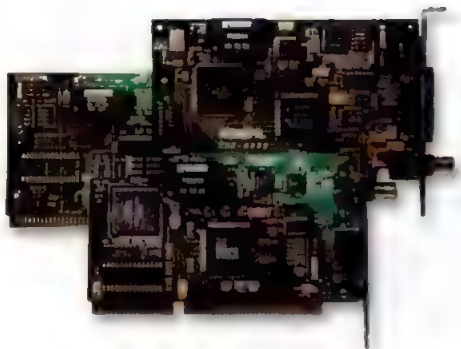
hardware can easily cost \$75,000 to \$100,000. Naturally, the exact hardware configuration for your server will depend on the site. For example, Microsoft's heavily used Web server runs on a Compaq ProLiant 2000 with

Company	Telephone	Web home page	Internet e-mail address
Beame & Whiteside Software Inc.	800-463-6637	None	sales@bws.com
CERN	+41-22-767-6111	http://info.cern.ch/	webmaster@info.cern.ch
InterNIC	703-742-4777	http://www.internic.net	hostmaster@rfi.internic.net
Interse	703-759-7375	http://www.interse.com/	info@interse.com
NCSA	217-244-3473	http://www.ncsa.uiuc.edu/General/NCSAHome.html	mosiac@ncsa.uiuc.edu
Netcom On-Line Communication Services Inc.	800-353-6600	http://www.netcom.com	info@netcom.com
Netscape Communications Corp.	800-638-7483	http://home.mcom.com	moreweb@tgc.com
Performance Systems International Inc.	800-827-7482	http://www.PSI.net	info@psi.com
The Santa Cruz Operation Inc. (SCO)	800-726-8649	http://www.SCO.com	info@sco.com
SPRY Inc.	800-777-9638	http://www.SPRY.com	None
UUNET Technologies Inc.	800-488-6384	http://www.uu.net	uunet-info@uunet.uu.net



RIDICULOUS?

ETHERNET ADAPTERS, LIKE PAPER CLIPS, ARE IN SOME WAYS ALIKE. THEY EITHER PERFORM OR THEY DON'T. THEY'RE COMPATIBLE OR THEY AREN'T. THEY'RE MADE EFFICIENTLY OR THEY'RE OVERPRICED. COMMON SENSE, UNCOMMON VALUE. KINGSTON. CALL (800) 435-0056, EXT. 906 AND GET THE FAX.



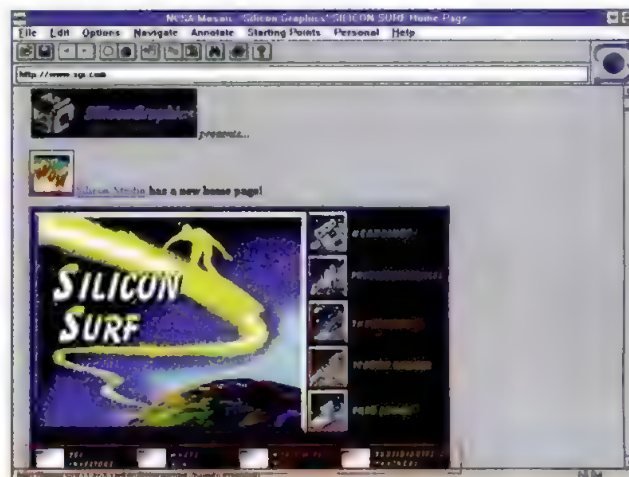
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Network Group (800) 435-2620 Phone (714) 435-2600 FAX (714) 435-2699

PC MAGAZINE CIRCLE 921 ON READER SERVICE CARD

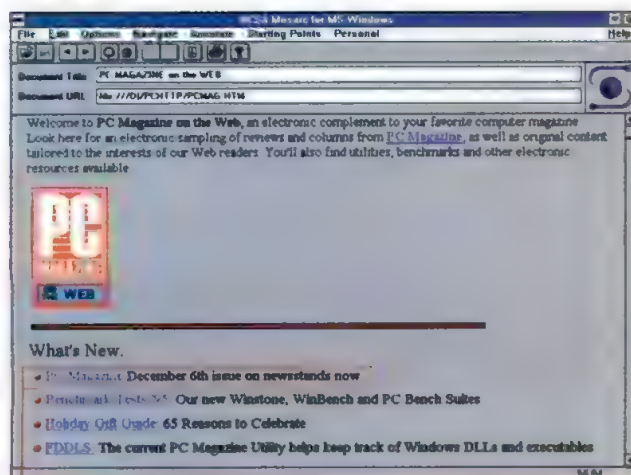
The Home Page Hooks

Given the varied combinations of forms, search tools, general Internet facilities, and graphics, no two Web sites are quite alike. Understanding your design options will help you get the most out of your on-line connection.



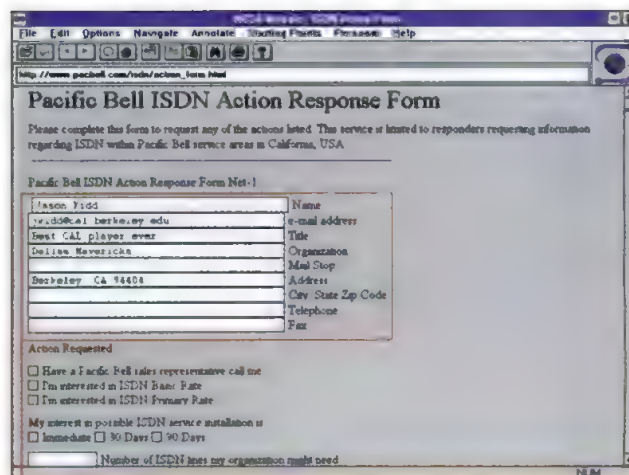
Traditional Web server II:

Even without fancy forms, you can really beef up your server.



Traditional Web server:

Click here to jump to any of the underlined topics.



Forms support:

Include forms support and you can gather information about your users.

two Pentium/90 processors, 128MB of RAM, and five 2GB hard disks; we estimate the price at over \$30,000.

Cost also refers to the level of expertise that you have in-house. For instance, choosing a SPARCstation 20—which offers excellent features and performance—without the required expertise would mean expensive consultant time. You might be able to perform the same task by choosing Windows NT or OS/2 as your platform and investing in a high-end multiprocessor server.

Once you decide on your platform, you

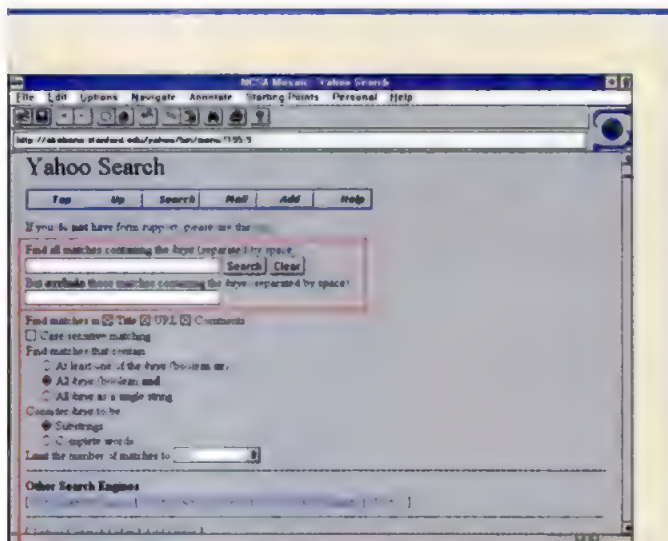
need to pick the type of software that best fits your needs. There are versions of HTTP server software available for a number of operating systems and platforms. If you are enterprising, you can even write the software yourself, since the source code and a set of instructions are publicly available on the Internet at <http://info.cern.ch/hypertext/WWW/Daemon/JanetAndJohn.html>.

HOME PAGES

The best way to decide on the appropriate platform and software is to decide the

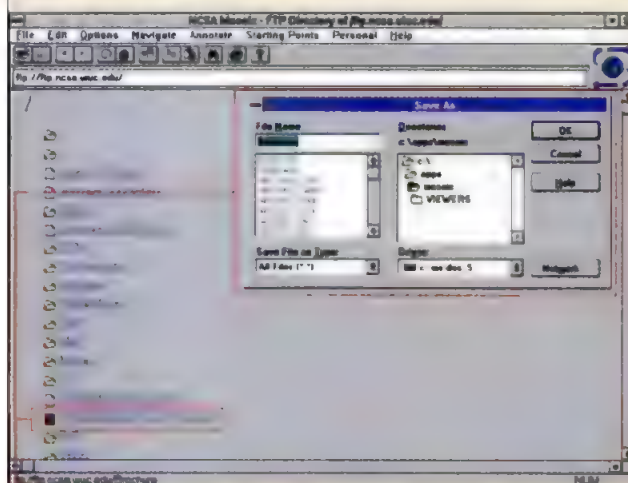
purpose of your server. In our testing, we found that there are currently two ways you can utilize a Web server. You can include basic documents that convey information and provide links to other sites. Or you can set up a more complicated Web server that integrates search engines and forms. In the future expect—perhaps most impressive—a third alternative, which will add security to Web servers so they can conduct financial transactions on the Internet.

The most basic way to utilize the Web is to provide company information and



Search engine:

With a search engine and forms, Web servers let users search the Internet by entering a phrase here.



File transfer:

If you add FTP hooks to your Web server, users can easily retrieve all sorts of files, such as product documentation.

links to other sites via a home page. The content can include text, graphics, and sound, and it can be accessed with any Web browser on the network. These pages are created using HTML, a simple but powerful scripting language offered by a number of HTML editors available on-line. (If you want a wealth of information on writing a home page see <http://mosaic.mcom.com/home/how-to-create-web-services.html>.)

Any of the Web server products checked out are fine for publishing basic home pages. The decision on the product

include SCO Global Access and the CERN HTTPd for Sun, proved to be more difficult to install and configure. The other shareware versions of the HTTP server that we looked at—MacHTTP for the Macintosh, and a version of the CERN server that runs on Windows NT—were also easy to install and configure. Neither lets you manage the Web server remotely.

We found little difference among the products in functionality. SCO Global Access was the only product here that did not offer forms support. We also found that MacHTTP does not support CGI

and platform, however, again depends on your expected traffic. For example neither the Macintosh running Mac HTTP nor a PC running NCSA HTTPd for Windows offer the operating system to service many Web requests.

Of the products here, Netsite Communications Server, from Netscape Communications Corp., offered the best combination of features and functionality. Netscape covers the majority of Unix platforms on the market today with offerings for HP, IBM, Sun, and Silicon Graphics workstations, along with a BSD-compliant version for Intel-based Unix platforms, with the Netsite Communication Server. We tested the Netsite Communications Server on a SPARCstation 10. In our testing we found that the Netsite Communications Server was the easiest to install and configure and offered the richest set of features, such as a graphical installation routine and full remote management of the server. The rest of the Unix products in the group, which

Shell Scripts, a necessary feature if you want to add extra Internet functionality such as FTP and Gopher within your documents. When setting up a server, you should also consider the memory requirements of each product. While none of these products define a preset requirement for memory, that amount is dependent on the traffic of your server. The more memory you have, regardless of the platform, the better your performance and the server's response time will be.

HOME PAGE • FORMS • GATEWAY SERVICES

The second and more complex level of service on the Internet involves not only setting up home pages, but also providing gateway services to other Internet resources such as FTP, Gopher, and Wide Area Information Service (WAIS), along with forms support. These servers are best suited for sites that want to provide a multitude of services from product information to technical support. The way to provide other services via the Web is with CGI Shell Scripts. These simple scripts, which you can write or acquire over the Internet, allow your Web server to act as a gateway to other Internet services such as Gopher and news. All the products here, except MacHTTP, support CGI Shell Scripts.

Form support is another important factor to consider. If you want to gather user information, conduct surveys, or even provide interactive services, then forms support is a must. Forms must be supported by both the client and the server for successful implementation. Forms makes Web browsing an interactive process for the user and the provider. Of the products we looked at, only SCO Global Access and MacHTTP did not support forms.

What good is the information if you can't find it! Search tools are another way to enhance your home page offering. You can provide either local or wide area searches. There are number of search tools currently available on the Internet: Veronica, for instance, searches gopher servers. The most popular search tool for the World-Wide Web is WAIS, a distributed text-searching system. WAIS is a subset of Z39.50—a spec that provides a common language for clients and servers to retrieve information and conduct queries for documents across the Internet.

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FINANCIAL TRANSACTIONS

The most difficult of the services is conducting financial transactions over the Internet. That means doing banking and buying products using the Internet. While it holds a lot of promise for the future, this type of service is not yet feasible, because there are no viable security measures. At present, critical information such as credit-card numbers and financial records is not encrypted and can be intercepted by any savvy Internet hacker. This poses a problem for anyone planning to perform commerce over the net. There are, however, two solutions on the horizon that promise to rectify this situation.

The first is called secure HTTP (S-HTTP) and is being undertaken by a consortium that includes Enterprise Integration Technologies, NCSA, and RSA Data Security. S-HTTP is a revision of HTTP that will enable the incorporation of various different cryptographic message formats, such as DSA and RSA standards into both the Web client and the server; most of the security implementation will take place at the protocol.

The second measure—called security socket layer (SSL)—which is under consideration by Netscape, plans to use RSA security to wrap security information around HTTP. This implementation, while different from S-HTTP, accomplishes the same task. The benefit of SSL over S-HTTP is that SSL is not restricted to HTTP, but can also be used for security for FTP and telnet among other Internet services.

To implement security correctly we need a standard. Thus security would be provided for the client as well as the server. As both security camps are currently working with the World-Wide Web Organization (W3O), it is likely that in the near future they will collaborate to develop a single standard.

While you might not want to perform financial transactions over the Internet, the Web remains an invaluable tool for customer support and advertising. So join your customers and get a head start on your competitors. What are you waiting for?

O. RYAN TABIBIAN is a technical analyst for *PC Magazine* Network Edition.

▶ FAST ETHERNET ADAPTER

Intel's EtherExpress Pro/100: Safe at Any Speed

BY JEFFREY D. BAHER

Things are really heating up in the Fast Ethernet market, thanks in part to Intel Corp.'s new EtherExpress Pro/100 LAN adapter. This 32-bit, bus-mastering adapter is the first to operate at both 10 Mbps and 100 Mbps, giving you the flexibility to use the Pro/100 on both Ethernet (10 Mbps) and Fast Ethernet (100 Mbps) LANs. And since it costs less than \$400, you should be able to find room in your budget for the Pro/100.

You can install the cards now and upgrade the network to Fast Ethernet later.

The Pro/100 is available for either PCI (\$259) or EISA (\$399) PCs and can operate in both servers and clients. Physically, the card is unremarkable, with a single RJ-45 port and two status LEDs on the back. Functionally, however, the Pro/100 is a piece of work. It's actually two network adapters in one: By automatically sensing the type of network it's attached to—Ethernet or Fast Ethernet—the Pro/100 adjusts itself to the appropriate speed. There are no jumpers to set and no cumbersome software-configuration utilities.

MULTIPLE LEDs

These indicate network speed, link state, and card activity.

ENHANCED ETHERNET CONTROLLERS

These allow the EtherExpress Pro/100 to support Ethernet (10-Mbps) and Fast Ethernet (100-Mbps) connections.

**SINGLE RJ-45 PORT**

This automatically senses the network type and operates at the appropriate speed.

32-BIT ADDRESSING, BUS MASTERING, AND STATIC RAM

These allow the card to function in both clients and servers.

Although more expensive than other Ethernet adapters, the EtherExpress Pro/100 offers numerous advantages to justify the cost.

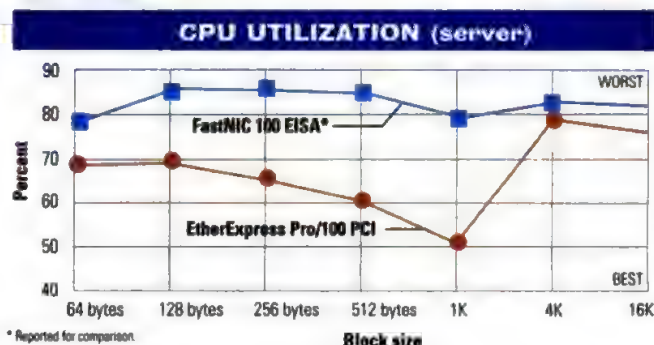
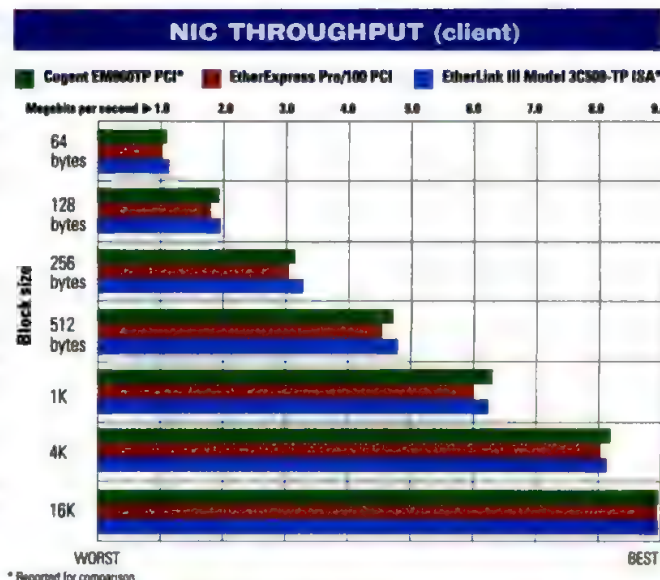
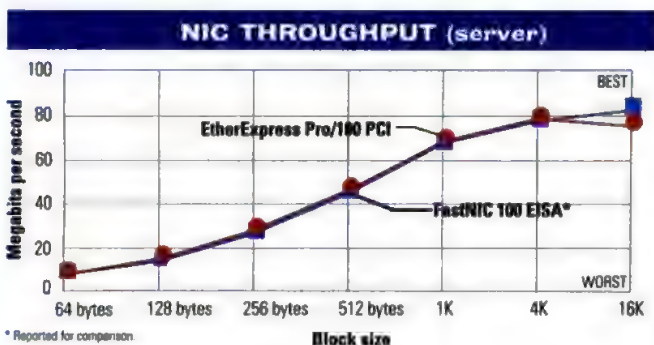


Benchmark Tests: Fast Ethernet Adapters

Intel's EtherExpress Pro/100 PCI proved to be a strong server adapter. Installed in the server, the Pro/100 PCI produced slightly higher throughput than Grand Junction Networks' FastNIC 100 EISA for all but the largest block size (16K). The FastNIC pulled ahead here because of its more efficient use of NetWare's burst mode. This was also apparent when we looked at CPU utilization: Despite consistently better CPU Utilization scores, the Pro/100 PCI again faltered slightly—with the two largest block sizes.

When installed in Ethernet clients (10 Mbps), the Pro/100 PCI performed well, but less impressively: It ran slightly behind both the Cogent EM960TP PCI and 3Com's EtherLink III Model 3C509-TP ISA for every block size. We also tested the Pro/100 PCI's performance as a Fast Ethernet (100-Mbps) client adapter (results not shown), where it turned in a maximum throughput of 64 Mbps.

Our NetWare 3.12 test-bed consisted of 16 clients, an HP NetServer LF 5/66 server, and a Grand Junction FastSwitch 10/100 AG switch. The **NIC Throughput** test from NetBench 3.0 measures the amount of data a client can transfer across the network in 1 second. We measured **CPU Utilization** using Novell's STAT.NLM.



BUILT-IN MIGRATION PATH

With the capability of operating at either 10 Mbps or 100 Mbps, the Pro/100 adapter includes a built-in migration path for your LAN. Using this adapter, you can outfit your entire network with Fast Ethernet—ready cards without having to make the actual move to Fast Ethernet just yet. When you do decide to upgrade, you will have to change only the hub or switch to which the Pro/100 clients are attached. Given the relatively low price of the Pro/100, we see it as a bargain.

That's not to say the Pro/100 is cheap: It's roughly \$100 to \$200 more than 3Com's EtherLink III Model 3C509 (\$160) or Cogent's EM960TP PCI (\$170 to \$200). That difference can certainly add up if you have to refit hundreds of clients—but the up-front expense may be worthwhile in the long run.

Although Fast Ethernet is in its infancy (and in fact is only now being ratified as

an IEEE standard), the market is poised for tremendous growth over the next few months. With the Pro 10/100, Intel joins Fast Ethernet pioneer Grand Junction as the second vendor to deliver Fast Ethernet products. In the coming months, expect to see several more 10/100 adapters from vendors such as D-Link Systems, Network, Standard Microsystems Corp. (SMC), and 3Com Corp. Thomas-Conrad Corp. and Cogent Data Technologies, meanwhile, plan to deliver only 100-Mbps cards. Additionally, Fast Ethernet switches and repeaters are already available from Grand Junction and Network, while Bay Networks (SynOptics and Wellfleet) and others should deliver soon.

SEE HOW IT RUNS

We tested the Pro/100 PCI's 10-Mbps and 100-Mbps performance in several configurations (see test results above). As a 100-

Mbps server card, the Pro/100 outperformed our reference unit, Grand Junction's FastNIC 100 EISA, by a narrow margin on most tests. At the time of this review, no other PCI Fast Ethernet adapters were available for testing. The Pro/100's 10-Mbps client performance didn't break any records, but it was nothing to sneeze at, either. Finally, as a 100-Mbps client, the Pro/100 PCI's performance topped off at over 60 Mbps.

The EtherExpress Pro/100 PCI is not the top-performing network adapter on the planet, but performance isn't the card's selling point. The built-in, affordable migration path to Fast Ethernet is—and that's a powerful selling point indeed.

► **Intel EtherExpress Pro/100.** List price: PCI version, \$259; EISA version, \$399. Intel Corp., 2200 Mission College Blvd., P.O. Box 58119, Santa Clara, CA 95052-9118. 800-538-3373.

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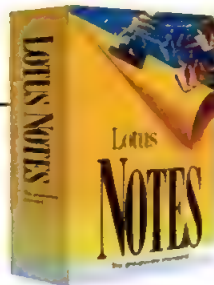
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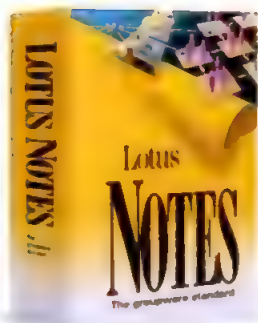
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As you peruse this directory, note that it contains a cross section of Business Partners including application developers, consultants, service providers, education centers, system and network integrators, support centers and resellers. And right now, they are designing, customizing, implementing and supporting Lotus Notes-based solutions for companies just like yours. Solutions range from products that extend Notes, such as workflow and document management, to applications development and database tools, to complete business solutions for industries as diverse as health care, legal, pharmaceutical, insurance, manufacturing, retail, petrochemical, publishing and financial services.

Charles B. Hamlin
Vice President, Corporate Marketing

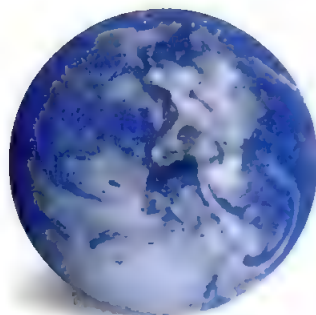
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CASE STUDY

Coca-Cola Enterprises Inc.

The Atlanta-based corporate Human Resources department at Coca-Cola Enterprises assists local management in hiring middle-and upper-level personnel. In early 1994, the group began a search for a way to automate its resume tracking process. The group's search led to SkillSet Software Inc., a Lotus Business Partner. SkillSet has developed an applicant tracking system called Desktop Recruiter for Lotus Notes that is a series of Notes templates that work together.

"Before we had this system, if somebody sent a resume in response to a specific ad, and was not hired for that job, we had no easy way to get back to that resume if another position opened where that person might have been a good fit," says John Rains, Corporate Manager of Human Resources. "Since implementing the pilot we have hired people from the database."

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President, Hurwitz Consulting



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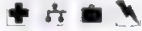

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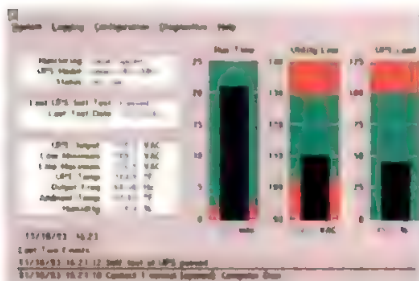
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CASE STUDY

Chase

With account managers in different cities around the world servicing the same international clients, Chase keeps everyone working together by integrating all client information in a Notes database called "Client Tracking". Now account service people all around the world, work from the same "live" qualitative information. From meeting minutes and issue discussions, to selected financial news service reports and loan profiles, every account manager is always up-to-speed. With over 3700 installations, Chase's CIO says, "Notes has revolutionized the way we collect, share and distribute information across the global enterprise."

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Source: "Lotus Notes: Agent of Change,"
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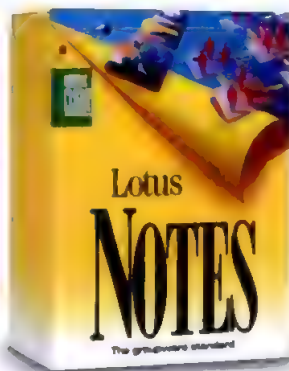
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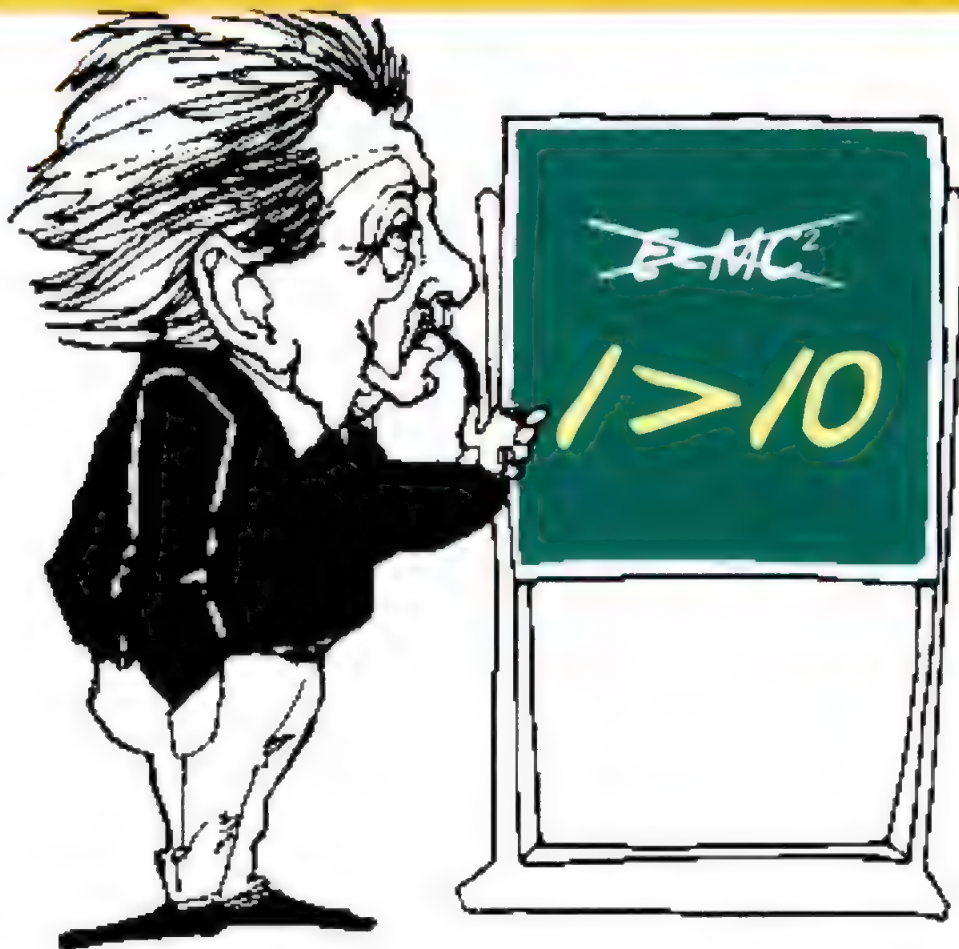
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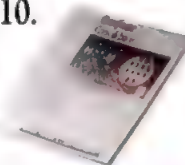
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The **System Standards** database is designed to help the Notes roll-out team plan for the strategic growth of the Notes environment.



The **Development Standards** database provides a foundation for the Notes development

team. This documentation database assists the developers in creating a common "look and feel" for all Notes applications.



The **Extended Formula Catalog** database is a compilation of formulas that WPC has compiled through its development projects. This application allows the developer to copy and paste Notes code, and thus expedite the development process.



The **Design Element Encyclopedia** database provides a management tool for depositing and approving key database elements in the corporate wide Notes environment.



The **Quality Assurance** database provides a means to administer the adherence

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CASE STUDY

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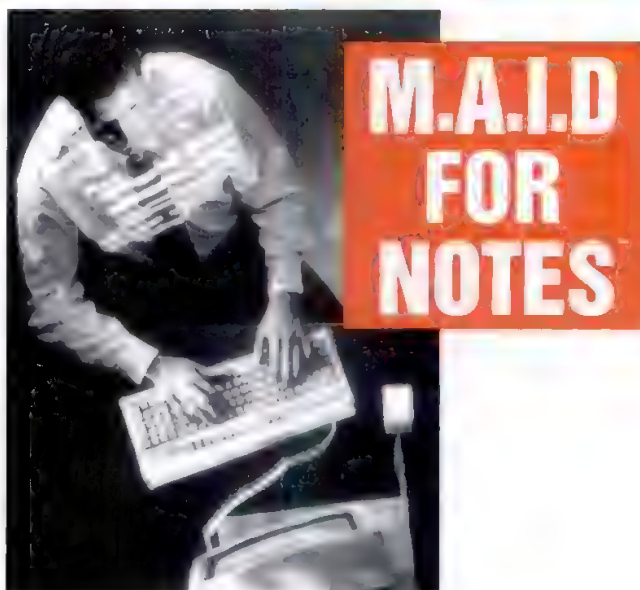


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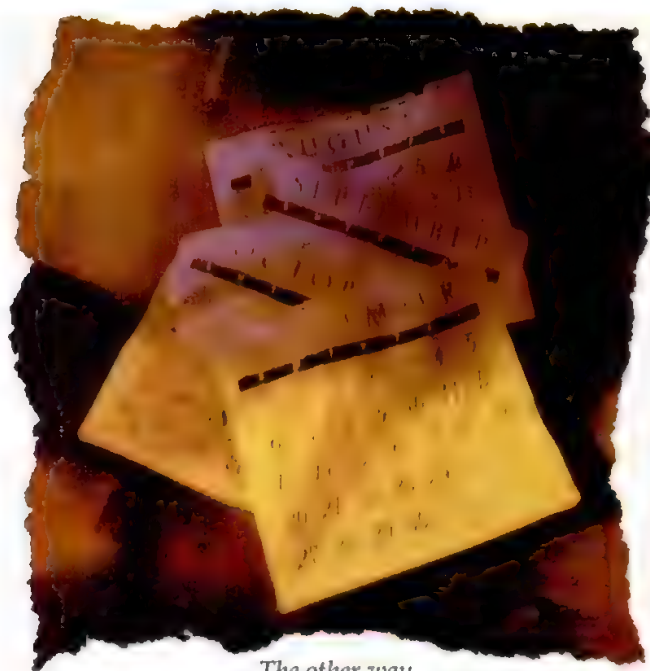
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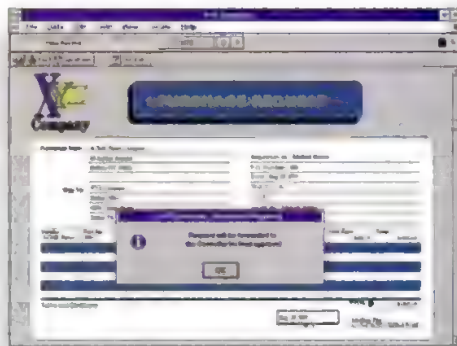
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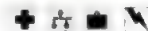
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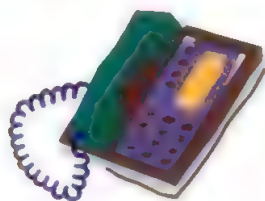


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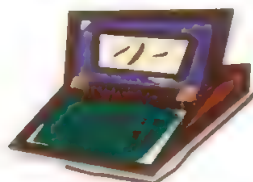
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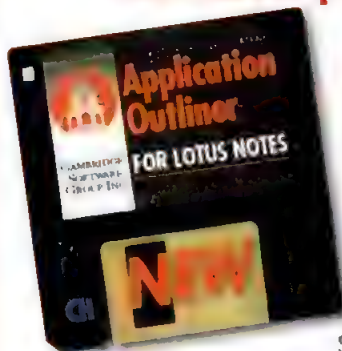
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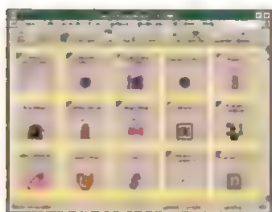
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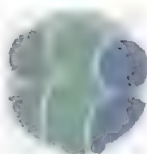


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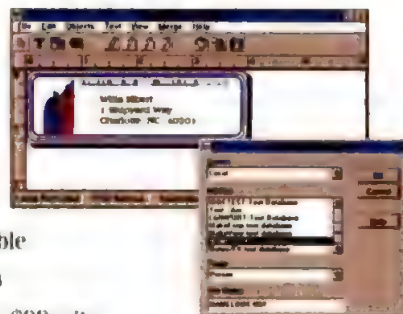
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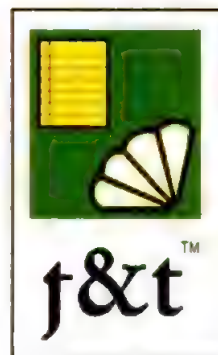
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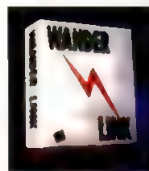
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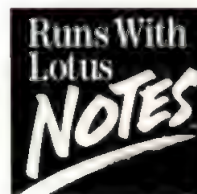
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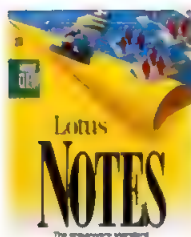
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► NETWORK STORAGE

LANStor SuperFlex: Room to Grow

BY STEVE RIGNEY

Big hard drives aren't new, but throwing several into a single 1-terabyte array is very new. LANStor SuperFlex, a flexible new disk array subsystem, from Storage Dimensions, is the first NetWare device to provide so much capacity through a single server. Best of all, you can incrementally build up to that capacity. The catch? You'll need to combine 40 separate SuperFlex chassis into a single array to get near the terabyte mark and that means big bucks—close to \$1 million.

The SuperFlex (\$24,255 as tested) is essentially a big PC-like chassis with lots of available drive bays. It works with any network operating system but only supports the terabyte capacity—and RAID levels 5 and 6—with NetWare. It has seven slots for hard disk (Fast SCSI or Fast/Wide SCSI) or digital audio tape (DAT) drive modules. The hard disk modules are available in 1GB, 2GB, and 4GB capacities, while the DAT drives are 4GB. Each of the slots in the SuperFlex is connected to a high-speed SCSI back-plane, which means that each drive module simply plugs into the chassis without extra cabling. You can, however, only use Storage Dimensions' drive mod-

ules with the SuperFlex, since they are designed specifically for the chassis and bus attachments.

Because not everyone will need—or can afford—a full terabyte, the SuperFlex can accommodate any combination of hard disks and DAT drives for a variety of network storage and backup needs. The chassis also houses multiple fans and power supplies. The fans, power supplies, and drive modules are all hot-swappable.

We disconnected one of the hard disks during a heavy disk write to simulate a disk

failure, and the SuperFlex immediately switched over to our hot-spare drive as a replacement.

NETWORK MATH

The brain of any array is the controller. The SuperFlex lets you use one of two: the SCSI-2 controller or the RaidFlex Array controller. The SCSI-2 controller turns the SuperFlex into one big hard disk, with a maximum capacity of 28GB (seven 4GB hard disk modules). But very few people are likely to shell out this kind of money without opting for the RaidFlex Array. This controller is equipped with an Intel i960 processor and dual I/O channels, allowing the SuperFlex to act as a massive RAID subsystem with support for RAID levels 0, 1, 5, and 6. Through RAID level 0, the SuperFlex allows you

to spread—or stripe—your data across multiple hard disks. You can also configure the SuperFlex system to provide multiple copies of your data using RAID level 1 (the disk mirroring and duplexing specification).

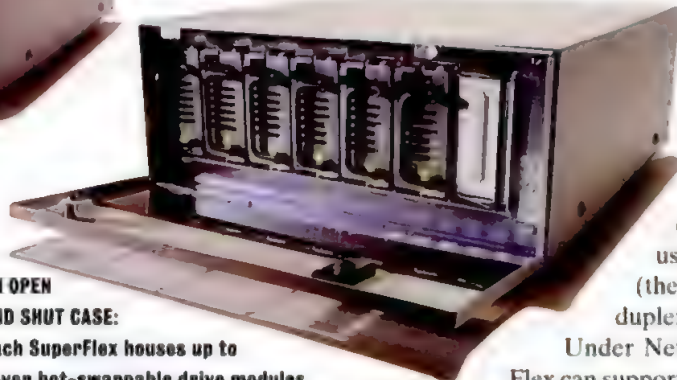
Under NetWare, the SuperFlex can support RAID level 5 and

perform a parity check on all of the data on your NetWare volumes. Finally, through RAID level 6, the SuperFlex allows you to configure an individual hard disk module as a *hot spare*, meaning that it will take over for another drive in the event of a failure (for more on RAID, see "RAID to the Rescue," *PC Magazine*, September 14, 1993).

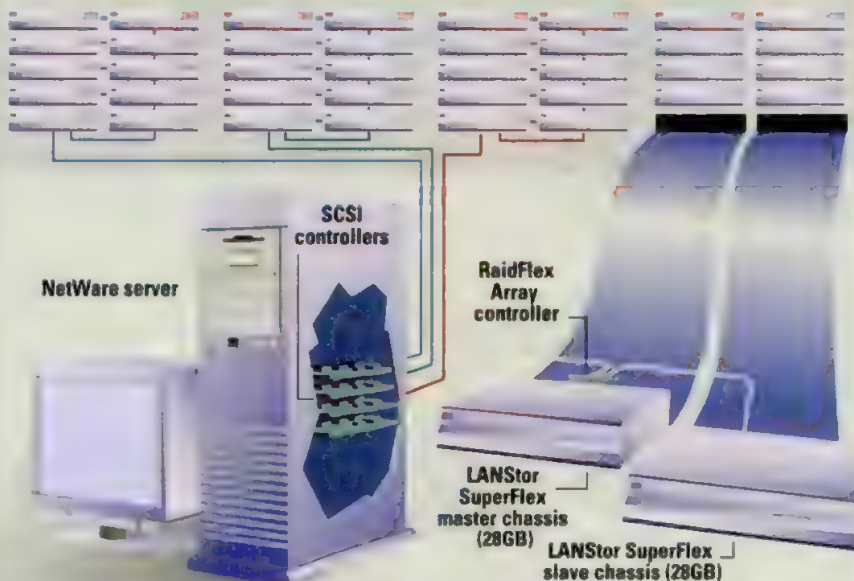
Additionally — and this is where things get compli-



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Each SuperFlex houses up to seven hot-swappable drive modules.



What a Terabyte Looks Like



cated—each RaidFlex Array controller can support two SuperFlex chassis: one *master* array and one *slave* array—for a total capacity of 56GB. The RaidFlex Array controller resides in the master array, while the slave array is daisy-chained off of it. Each RaidFlex Array controller, in turn, connects to your server via a standard EISA- or PCI-based SCSI controller, each of which can actually support five separate RaidFlex Array controllers. Since one server can support four SCSI adapters, you can attach up to 20 RaidFlex Array controllers—each plugged into two SuperFlex chassis for a total of 56GB—to a single server. All totaled, you have a maximum capacity of just under 1 terabyte (don't worry, it's all in the diagram).

TOO MUCH TROUBLE AND MONEY?

It's not as unrealistic as it might sound. While most NetWare LANs have no need for nearly a terabyte of storage, some engineering and rendering environments would be well-served by—and willing to pay for—such a capacity. In addition,

► FACT FILE

LANstor SuperFlex

List price: \$24,255 (tested configuration) **In short:** The LANstor SuperFlex is a flexible, expandable, but expensive network-storage subsystem. By daisy-chaining multiple SuperFlex chassis together, you can access almost a full terabyte through a single NetWare server.

Storage Dimensions, 1656 McCarthy Blvd., Milpitas, CA 95035, 408-954-0710; fax, 408-944-1200

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those networks that need far less storage (10GB, 20GB, or even 100GB) might go with the SuperFlex because of the convenient expandability it offers.

The SuperFlex is also very flexible. The array's backplane is segmentable, so you can divide it into two smaller SCSI backplanes. For example, we connected three hard disk modules to one NetWare 3.12 server and three others to a Microsoft Windows NT Workstation PC. We filled the seventh slot with a DAT drive for network backups.

Of course, our test configuration had a retail price of over \$24,000, which included

a RaidFlex Array controller, six 2GB hard disk modules, a SCSI controller, and a DAT drive module. Digital Equipment Corp.'s StorageWorks RAID Array 210-6300 costs just over \$15,000, similarly configured. The difference is that, unlike the SuperFlex, the StorageWorks array cannot be expanded, and it does not support internal backup devices such as DAT drives.

Setup and configuration is fairly simple if you know your way around SCSI and NetWare (if you don't, you're in for a long day). For NetWare LANs, all you have to do is run the Install NLM, which formats all of the SuperFlex drives. The last step is to install the LANstor NLMs and decide whether or not you want each of the various RAID levels.

The LANstor SuperFlex is designed for growth, but only if you have large storage needs and the bank book to pay for them. SuperFlex allows you to configure just about any size and type of SCSI storage system that you can imagine. It also provides fault tolerance to protect your data and provide continuous access in the event of a disk failure. □

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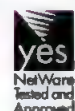
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▶ LOTUS NOTES UTILITIES

Brainstorm's Easy Data Converter

BY TONY POMPILI

Finally, there's a simple and affordable way to access your high-end databases through Lotus Notes. Brainstorm Technologies' DataLink, Version 1.0, lets end users easily convert data from nearly two dozen common database formats into Notes format (and vice versa), letting them take advantage of Notes' powerful viewing and editing tools.

DataLink is a Microsoft Windows-based application with two components: the DataLink executable and an integrated scheduling utility, conveniently called Scheduler. Priced at \$1,495, DataLink requires Notes 3.x client software and 8MB of RAM on the client. You can run it with less than 8MB of memory, but we found that using less RAM caused several errors during the conversion process.

DataLink converts data using Microsoft's Open Database Connectivity (ODBC) API (for more on ODBC, see "The Database Answer?," Network Edition, November 8, 1994). Using ODBC as the interpreter, DataLink can move data from 23 ODBC-compliant databases (including Microsoft SQL Server and Oracle7 Server) to Notes format. DataLink can also convert the data back from Notes to any one of the 23 supported database formats.

DataLink targets Notes end users, a market thus far left alone by most vendors. While there are other products out there that move data in and out of Notes, they are typically too complex or too expensive for the average user. For example, Trinzic Corp.'s InfoPump is a very powerful, but very expensive, data-conversion tool (over \$35,000). InfoPump is also extremely difficult to master. On the other hand, Lotus ViP (\$995) is cheaper than DataLink but also more complicated. ViP is intended for use by Notes developers, not end users.

DataLink's interface is extremely simple. Windows on the left and right of the screen display the source and destination databases (respectively) and all of their fields. A mapping window in the middle of the screen lets you match fields in the source with fields in the destination. For example, if "Name" is the first field in the source database but the third field in the

that ran every hour. At the beginning of each hour, Scheduler launched DataLink and ran our template. We found this useful for keeping the Notes version of a database current with the native database.

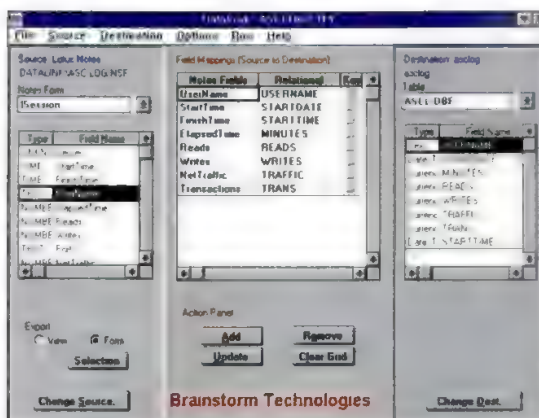
DataLink's synchronization feature can be used to update only specific portions of a given database. This saves time during conversion, since only a few fields need to be converted, not the entire database. We found this feature useful when we used it in conjunction with Scheduler.

If you need to massage your data during conversion, DataLink allows you to concatenate (combine) fields, perform calculations based on numerical data, and even launch actions for one field based on the data in a previous field. All of these features are outlined in the manual, but we found the explanations a bit confusing; you may want to study closely before trying them.

DataLink does have a few other shortcomings. For starters, DataLink doesn't let you create new destination databases. It only lets you modify existing databases. This problem is shared by other products, such as Lotus ViP, that rely on ODBC. What this means to you, the user, however, is that you need first to create a new database through Notes or a third-party application before converting data into it with DataLink.

We also ran into problems setting up a dBASE conversion, because our test file used a field name that was specific to dBASE and not supported by ODBC. Unfortunately, since the ODBC drivers sent limited and ambiguous error messages through DataLink, locating the problem proved to be difficult and time-consuming.

Still, DataLink is easy to use and much more affordable than most of its competitors. It suffers from a few ODBC quirks, but it can be a powerful add-on for any environment where there is a need to move data back and forth between high-end databases and Lotus Notes. □



SIDE BY SIDE: DataLink's simple interface makes it easy for you to convert data into Lotus Notes format.

destination database, you can map the two simply by clicking on the first source field and then the third destination. Every mapping you select is saved in a DataLink template that can be reused or periodically run through Scheduler.

Scheduler lets you run data through a template at specific, user-defined intervals. For example, we created a template

▶ FACT FILE

DataLink, Version 1.0

List price: Single user development license, \$1,495; three-user runtime license, \$745 **In short:** DataLink is an affordable, easy-to-use data conversion utility for moving data to Lotus Notes format from most ODBC-compliant database formats, granting users access to high-end databases through the Notes interface. While generally sound, DataLink does suffer from a few ODBC-related quirks.

Brainstorm Technologies Inc., 24 Thorndike St., Cambridge, Mass. 02141; 617-492-3399; fax, 617-492-9126

951 on reader service card

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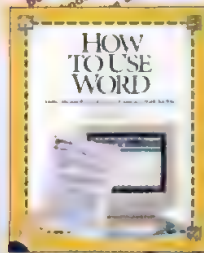
2 Contents 2 What Are DOS and Windows?

How to Use the Mouse in Windows

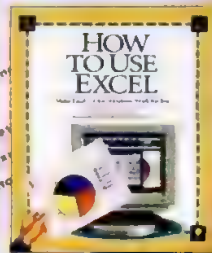
A mouse is a means of giving instructions to the computer. You're probably familiar with the keyboard as the most common input device. A mouse, so named for its hunched over appearance and tail-like cable, is a hand-held input device that along with the keyboard is one of the two input devices most people use routinely in Windows. Although it's possible to get by without a mouse and do all your work from the keyboard, it's not too wise. The Windows interface was designed with the mouse in mind. Keyboard alternatives can be awkward, and it's not always easy to find out what they are. Like a few minutes to learn the major mouse moves, and you'll reward yourself with smoother computing.

TIP SHEET

Unless told otherwise, use the left mouse button. The other mouse buttons are used so infrequently that they are always told about a

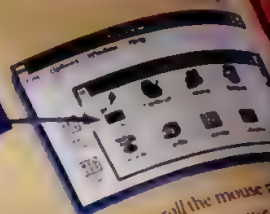


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B-444 \$13.95



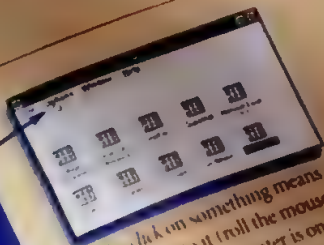
ISBN: 185-4
B-444 \$13.95

The mouse pointer is on the Write program icon.



1 To roll the mouse move the mouse tabletop without one of the mouse As you roll the mouse pointer moves in the direction that you roll the mouse.

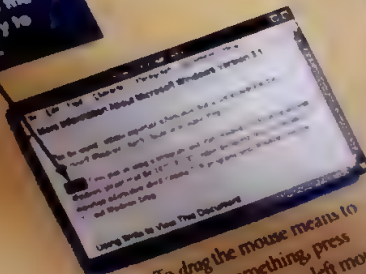
To pull down the Options menu, click on the mouse button, holding a mouse button, click on the mouse.



2

To click on something means to point to it (roll the mouse so the mouse pointer is on top of it) and then press and instantly release the left mouse button. To double-click on something means to point to it and then click the left mouse button twice in rapid succession.

Drag across a word to select it. Then press the Delete key to delete it.

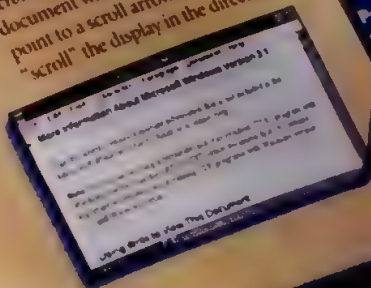


3

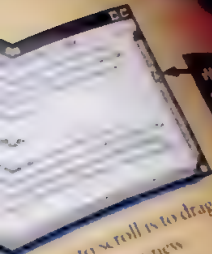
To drag the mouse means to point to something, press and hold down the left mouse button, roll the mouse, and then release the mouse button. For example, you can "select" a block of text for deletion by dragging from one end of the block to the other.

4

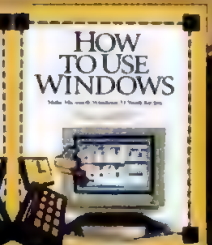
Scrolling is one of the most common mouse actions. When a document window cannot accommodate all its contents at once, point to a scroll arrow and hold down the left mouse button to "scroll" the display in the direction of the arrow.



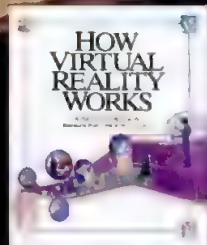
Point here and hold down the left mouse button to scroll down through the document.



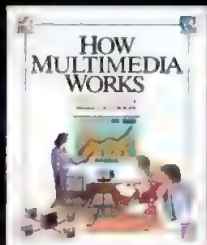
Another way to scroll is to drag the scroll button to a new position along the scroll bar. The position of the scroll button suggests what part of the contents you are viewing.



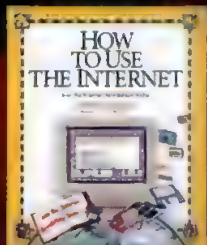
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► SECURITY AND ENCRYPTION

Two Padlocks for Your Data

BY GARRY FRENKEL

What if password protection isn't enough to safeguard your data? Then try using AT&T's Secret Agent, Version 3.0, or DataMedia Corp.'s SecurExchange, Version 2.0. These two encryption utilities can safeguard your data from prying eyes. Of the two, SecretAgent is more versatile: It supports more encryption standards, offers excellent cross-platform support, and provides a better interface.

AT&T

• SecretAgent

SecretAgent, Version 3.0 (\$149.95 for a single user), is an easy-to-use, Microsoft Windows-based tool that encrypts and attaches digital signatures to network files so that they can be read only by SecretAgent users with the appropriate key. The latest release adds MAPI support to existing VIM and AT&T Access Plus e-mail support. This enables SecretAgent to encrypt and send e-mail messages on its own or in conjunction with Lotus cc:Mail and Microsoft Mail.

SecretAgent's interface is friendly and intuitive. Our only complaint is that there is no cancel option during encryption, which can take several minutes.

SecretAgent protects files using RSA public key encryption or the National Institute of Standards and Technology's Digital Signature Standard (DSS). Users activate encryption and decryption with their *private* keys; files are actually encrypted using users' *public* keys. To

provide a high level of security, SecretAgent forces users to provide their private keys (by entering passwords) for every file encrypted and decrypted.

SecretAgent users must make their public keys available in order for other users to send them encrypted files. We found the best

way to do this was to place an administrator in charge of the keys and give others read-only access to them.

SecretAgent is available for DOS, Windows, Macintosh, and several flavors of Unix. Each version can encrypt, decrypt, and digitally verify another version's files.

If you need to protect data in a multiplatform environment, SecretAgent is your solution.

► SecretAgent, Version 3.0. List

price: \$149.95 to \$249.95 per user, depending on the number of users. AT&T Secure Communications Systems, I-85 & Mt. Hope Church Rd., P.O. Box 20048, Greensboro, NC 27420; 800-203-5583; fax, 910 279-5140.

Circle 965 on reader service card

DataMedia Corp.

• SecurExchange

DataMedia Corp.'s SecurExchange, Version 2.0 (\$495 for ten users), is a Microsoft Windows-based utility designed to make sure your confidential e-mail stays that way. It works primarily as an add-on

for either Lotus cc:Mail or Microsoft Mail, although it can also be used without an e-mail system. SecurExchange encrypts messages using the RSA private and public key encryption standard, and centrally manages keys via the X.509 public key certificate standard.

X.509 is a part of the CCITT's X.500 Directory Services standard, which is used to authenticate public keys via certificates; each certificate comprises a user's public key and related information that identifies that user. After installing SecurExchange, we had

to submit a certificate request—with proper identification—to DataMedia, which then notarized our certificate. We then used the certificate, which is placed in the program's Master Recognition Database (MRD), to activate all of our user accounts by notarizing their certificate requests.

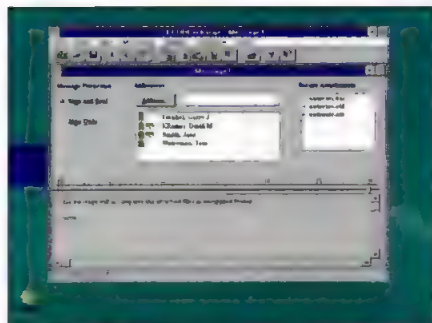
When users first log on to an e-mail system with SecurExchange, they automatically generate certificate requests. An encryption key pair is also generated at this time. Users protect their keys with a password that is entered only once per session.

Once all this is accomplished, SecurExchange users can send and receive encrypted messages by selecting other users with valid public key certificates. The address box can display only those users in the MRD, or it can display your entire e-mail directory. It took almost two minutes to list all 1,800 cc:Mail directory entries on our test network, so you may want to display just the MRD.

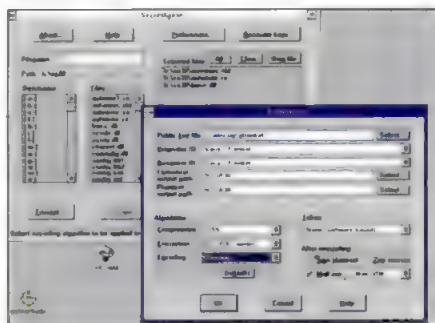
SecurExchange does provide tight security for your e-mail system, but it doesn't compare very well to SecretAgent, which is more versatile and intuitive.

► SecurExchange, Version 2.0. List price: 10 users, \$495; 100 users, \$3,195; 1,000 users, \$19,995. DataMedia Corp., 20 Trafalgar Sq., Nashua, NH 03063; 603-886-1570; fax, 603 886-1782.

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SECURITY ADD-ON: SecurExchange works with cc:Mail and Microsoft Mail to encrypt e-mail messages.



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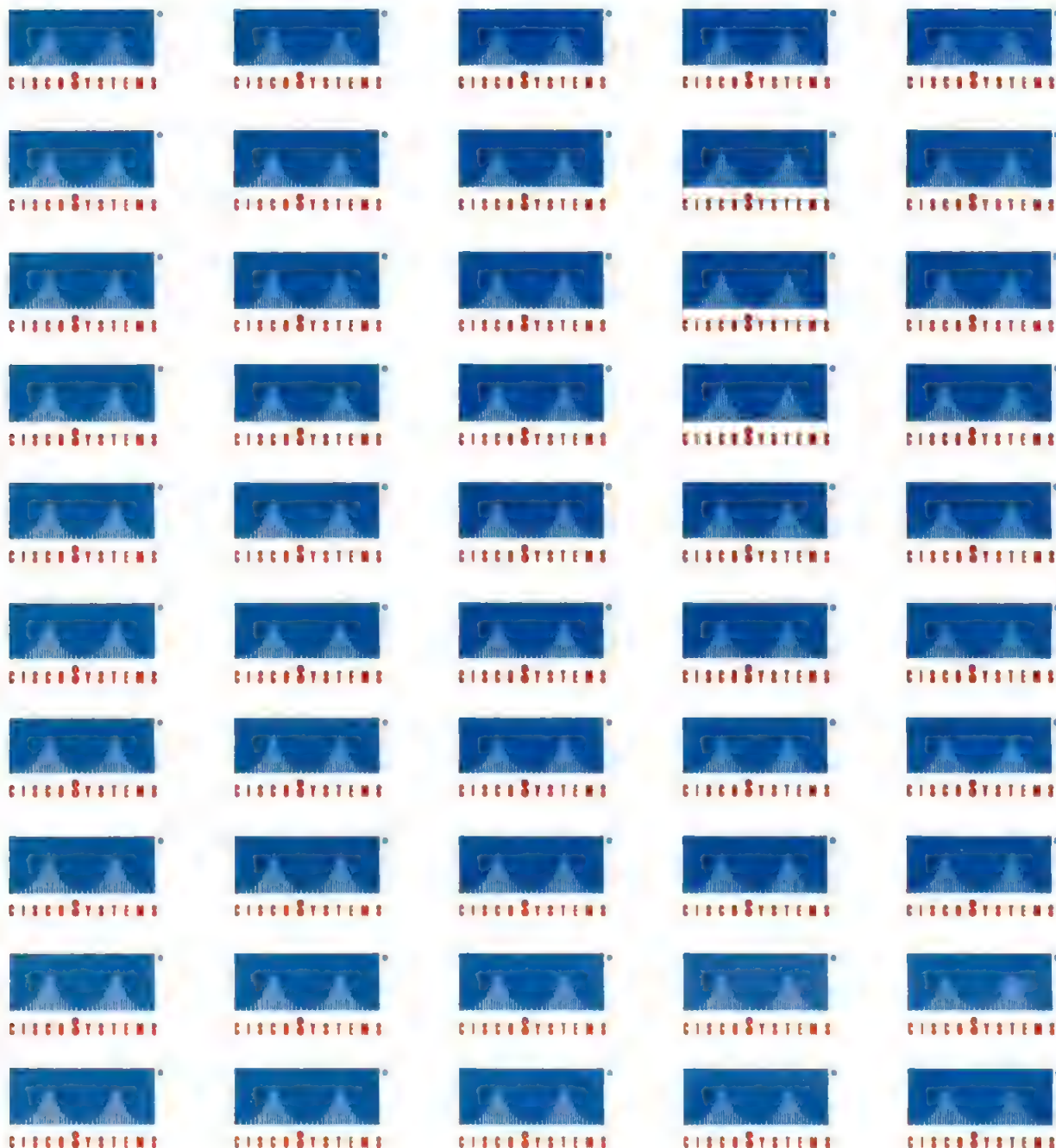


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► SOFTWARE METERING

A Sentry for More than Just NetWare

BY KEITH SCHULTZ

With Software Sentry, Version 1.0, from Microsystems Software, all network managers can take advantage of software metering. This easy-to-use Windows-based product keeps track of your applications across just about any network operating system—unlike most of its competitors, which only work with NetWare. But beware: A few simple DOS commands are just enough to foil this universal metering package.

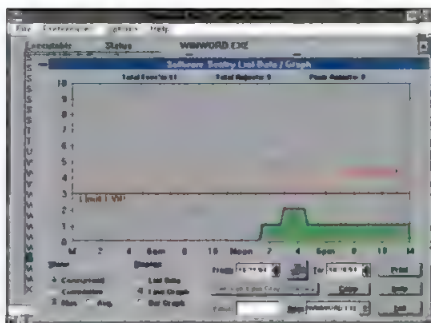
Software Sentry (\$595 for 250 users) is one of the few metering tools we've seen that uses a TSR on every client you wish to meter, rather than a central NetWare NLM. Without being tied to an NLM, Software Sentry will run across most NOSs, including LAN Server Advanced, LANtastic, Windows NT Server 3.5, and VINES, as well as all versions of NetWare. Also with Software Sentry's TSR, you can not only meter and block client applications, but also share client application licenses with other networked users.

Software Sentry installs very quickly: It took us roughly 10 minutes to load the main executable on one client PC and the 7K TSR on our server and each of our clients.

The interface is great. After you launch the executable, you can choose applications for metering from Software Sentry's master database. New applications launched on any Software Sentry-equipped PC are automatically added to this database and are eligible for metering.

Deciding how you want to meter an application is as simple as clicking on a title and selecting special options from a menu. For example, you can reserve the application for a particularly important user or block an application from being used on any PC running the Software Sentry TSR.

What's really convenient, though, is that Software Sentry lets you meter an application on a user's local drive and then share that license with other users.



TREND ANALYSIS: Software Sentry gives you several options for tracking software usage, including generating graphs of the data.

For example, assume that your organization has a 50-user license of Microsoft Excel and one of your Software Sentry PCs has an additional single-user license of Excel. Using Software Sentry, you can make that single license available to the

network, bringing the total number of network Excel licenses to 51.

Ironically, Software Sentry's strength—the TSR—is also its downside. While the product's architecture lets you meter applications on many different NOSs, it also makes Software Sentry an easy system to cheat. DOS 6.2, for example, lets you select which TSRs to load every time you boot your system. If you choose not to load the Software Sentry TSR, there's nothing to prevent you from launching a metered application. Users could also simply remove the TSR's load statement from their network startup and AUTOEXEC.BAT files.

If you trust your users not to play with their configuration files, you'll find Software Sentry to be a full-featured application metering tool—particularly if you're not running NetWare.

► **Software Sentry, Version 1.0.** List price: For 250 users, \$595. Microsystems Software Inc., 600 Worcester Rd, Framingham, MA 01701; 800-489-2001; fax, 508-626-8515; BBS, 508-875-8009.

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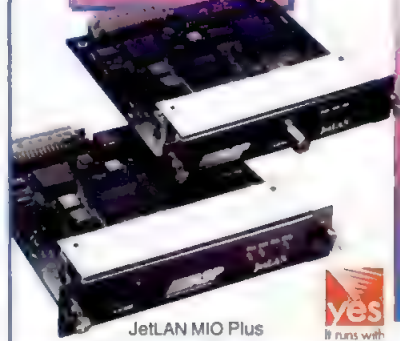
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ASP

► NETWORK ILLUSTRATION

SysDraw Puts Your Hardware in Focus

BY TONY POMPILO

There's nothing like seeing things as they really are. At least that's the idea behind Microsystems Engineering Co.'s new SysDraw, Version 7.1. This Microsoft Windows-based drawing package now includes over 1,200 highly detailed clip-art images of specific network hardware that can be used to create elaborate presentations and installation plans.

SysDraw, like most other general-purpose drawing packages, offers a basic array of tools that let you create illustrations by drawing lines, adding text, and



OVERCROWDING: SysDraw's network clip-art images are very detailed, but it doesn't take many to fill a screen.

grouping images together, among other things. The interface is generic but usable: To select a clip-art image, you simply pick

it from a list and drag it onto your drawing space. The product isn't network-specific, but the clip art certainly is. For example, SysDraw includes an image of Cabletron's MMAC-3FNB concentrator chassis, as well as images of the modules for that hub.

Though you could use SysDraw for creating network maps, we found that the images at SysDraw's level of detail quickly clutter the screen, making complicated maps largely unreadable. Still, network integrators and resellers could easily take advantage of this product to create detailed network illustrations for proposals and other types of presentations.

► **SysDraw, Version 7.1.** List price: With 300 images, \$299; with 1,200 images, \$995. Microsystems Engineering Co., 2500 Highland Ave. #350, Lombard, IL 60148; 800-797-3729, 708-261-0111; fax, 708-261-9520.

Circle 967 on reader service card

► LOW-COST ROUTER

Cisco's Unique New Router-on-a-Card

BY JEFFREY D. BAHER

Combine Cisco Systems with Microsoft Corp. and what do you get? The AccessPro PC Card (\$1,995 to \$3,995). This new low-end router is the first to be inspired by Microsoft Windows NT's need for an internetworking solution. The product—Cisco's low-end 2500 router condensed to fit on a full-length ISA PC card—routes a full complement of protocols between Ethernet or Token-Ring LANs and a WAN link, filling a critical niche in Microsoft's networking strategy.

The AccessPro is part of the Cisco Access Product line, which is geared toward extending Cisco's dominance in the router market from the central site to the remote workgroup. With the AccessPro, network managers save time by shipping servers to remote sites preconfigured for file, print, application, and now hardware-based routing service. Remote users need only hook up the appropriate cables

and turn on the machine. It's that easy.

Best of all, by being a complete router, the AccessPro won't steal PC resources (memory, CPU, and interrupts). The product uses only the PC for power. This makes the AccessPro attractive for sites that can't afford the higher cost of an external router or that don't want to burden a PC running any operating system with the processing overhead of a software-based router like Novell's MPR or Cisco/Newport Systems' LAN2LAN/MPR.

Perhaps the biggest drawback to this strategy is uptime and fault resilience. If you need to service the PC or should the PC crash naturally, the router won't operate.

EASY INSTALLATION

We installed the AccessPro card effortlessly in a Windows NT workstation and within a short amount of time we were routing between the local Ethernet segment and our central-site network over a simulated 56-Kbps synchronous link.

There are lots of ways to configure this

router, including telnet, a terminal session in the PC, CiscoWorks, and Cisco's Configuration Builder. We chose the terminal session and found that configuration was fairly straightforward, though we felt that the command line interface can be daunting for novices. Those users might consider using the graphical Configuration Builder.

You can select from any one of three groups of protocol support, which will cover more than you'll ever need. IPX, IPXWAN, and IP are the obvious protocols offered. IBM connectivity is also quite strong. These protocols can run over several types of WAN links, including T1/E1 and ISDN, as well as frame relay, HDLC, PPP, and X.25 protocols.

From virtually every aspect we were impressed with the AccessPro PC Card. The card operated without a problem in our Windows NT workstation, delivered solid routing functionality, and left the PC free to perform its normal functions. It's an ingenious compromise to achieve affordable remote-site routing.

► **AccessPro PC Card.** List price: \$1,995 to \$3,995. Cisco Systems Inc., 170 W. Tasman Dr., San Jose, CA 95134-1706; 408-526-4000; fax, 408-526-4100.

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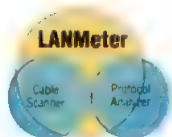
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News of announced network products and upgrades

By Vicki B. Jacobson

NEW

Proteon Readies New Remote Routers

Proteon's new remote access router, the Remote Branch eXchange (RBX) 200, combines Proteon's routing software with IBM's hardware. The RBX 200 comes with two WAN ports, an Ethernet or Token-Ring connection, and support for IP, source routing, and SNA internetworking. The company also announced plans for an ISDN version of the product

as well as additional protocol support

that will be available in the first quarter of 1995. The router is also fully compatible with Proteon's departmental and corporate routers, the CNX and DNX series. Proteon is also offering DLSw software. DLSw is a specification for encapsulating

PLUG AND PLAY: Even the untrained user can install Proteon's Remote Branch eXchange 200.

SNA and NETBIOS traffic over TCP/IP networks. The software also provides some fault tolerance by preventing SNA session time-outs and ensuring that all traffic gets through in spite of heavy congestion and link failures. The RBX 200 also features a utility called Quick-Config that makes installation plug-and-play. Management for the router is SNMP-compliant through platforms such as HP Open View and NetView/6000.

► **Remote Branch eXchange 200.** List price: \$1,990. Proteon Inc., 9 Technology Dr., Westborough, MA 01581-1799; 508-898-2000; fax, 508-366-8901.

Circle 956 on reader service card

NEW

Boca Research Makes Some Noise

PCs take on a new purpose with SoundExpression 14.4VSp, a PC card from **Boca Research** that combines multimedia and communications. The SoundExpression card integrates a high-speed fax modem, voice mail, speakerphone, and audio. Users can add just about any speakers, microphone, and CD-ROM to create their own multimedia center.

The built-in 14.4-Kbps V.32bis fax modem features data compression for throughput of up to 57.6 Kbps and error control. Users can send direct faxes, broadcast faxes, and forward faxes. Other features include an automatic cover sheet, on-screen viewing, automatic redial, scheduled faxing, and a phone book. For its voice mail capabilities, the card also supports 1,000 password-protected mailboxes, remote access to new or old messages and faxes, and pager notification. In addition, SoundExpression features hands-free speakerphone support, pop-up messages within Windows applications for notification of received calls, and 16-bit digital stereo sound.

► **SoundExpression 14.4VSp.** List price: \$179. Boca Research Inc., 6413 Congress Ave., Boca Raton, FL 33487; 407-997-6227; fax, 407-997-0918.

Circle 957 on reader service card

HOT PROSPECT

Creating ATMosphere

Fibermux Corp. shipped its ATMosphere Backbone switching hub. ATMosphere offers users a migration path from Ethernet to ATM.

ATMosphere has the ability to switch Ethernet packets to ATM cells, as well as to create and overlap virtual LANs. The switching takes place via ATMosphere's two components: a Virtual Networking Engine (VNE), and Crossbow Backplane Modules (CBM). The four-port CBMs are designed for any of Fibermux's Crossbow multi-LAN hubs. The modules convert data from Ethernet segments to ATM cells and forward the cells along a 200-Mbps backbone to the VNE. The VNE, which supports 16



Ethernet segments and multiple CBMs, switches the cells to an ATM network or, if the destination is an Ethernet segment, back into Ethernet frames that are forwarded to a user.

► **ATMosphere Backbone.** List price: Virtual Networking Engine, \$11,995; Crossbow Backplane Modules, \$9,995. Fibermux Corp., 21415 Plummer St., Chatsworth, CA 91311; 818-709-6000.

Circle 955 on reader service card

NEW & IMPROVED

Retix Expands ATM Availability

Retix upgrades its router family with its new ATM Interface Module (AIM) and a new version of its routing operating system, Version 3.0. Designed for its RouterXchange 7000 router family, AIM routes IP and IPX traffic between ATM and Ethernet, Token-Ring, FDDI, frame-relay, X.25, PPP, and leased-line interfaces. The router is also interoperable with all ATM switches, including those from FORE Systems and SynOptics Communications.

► **ATM Interface Module.** List price: \$8,000. **Operating System, Version 3.0.** List price: \$1,500. Retix, 2401 Colorado Ave., Santa Monica, CA 90404-3563; 310-828-3400; fax, 310-828-2255.

Circle 958 on reader service card

IMPROVED

MobileWare Is on the Road Again

With the most recent release of MobileWare Corp.'s remote access software, MobileWare, Version 1.1, mobile users can stay connected to their cc:Mail. Users can also print documents, send faxes, and transfer files to their NetWare network, while they are on the road. Version 1.1 of MobileWare also supports custom mobile applications and improved system management features.

The MobileWare remote access system supports large cc:Mail installations through compatibility with Lotus Corp.'s cc:Mail, Version 2.03. The MobileWare software can automatically update up to 10,000 mail directories and provide response times. Users can also develop custom applications using standard messaging APIs to be used with MobileWare. With Version 1.1, the adding of clients is a streamlined operation: Users can be installed over a LAN from a network server.

► **MobileWare, Version 1.1.** List price: \$280. MobileWare Corp., 2425 North Central Expressway, #1001, Dallas, TX 75080-2748; 800-260-7450; fax, 214-690-6185.

Circle 959 on reader service card

IMPROVED

Simware Gets Remote and Mobile Users Connected

A single call and a single package gives remote and mobile users access to any network resource with Version 3.0 of Simware's A2B connectivity software. Users get connected not only to their LAN, but to their networked applications as well. The software provides access to a variety of mainframe, minicomputer, and Unix systems. It also supports multiple sessions to multiple hosts, concurrently, using TCP/IP, IPX, SLIP/PPP, X.25, cellular, radio frequency, and direct-connect networks. Another new feature of Version 3.0 is its support for Visual Basic, allowing users to access client/server applications.

► **A2B, Version 3.0.** List price: \$395. Simware, 2 Gurdwara Rd., Ottawa, Ontario Canada K2E 1A2; 613-727-1779; fax, 613-727-3533.

Circle 960 on reader service card

BRIEFS

HUBS

IBM Corp. expands its line for the IBM 8250 Multiprotocol Intelligent Hub with new modules and improved management. The modules include a six-port router module (\$11,860) and a 10BaseFL module (\$450). Version 2.0 of the Intelligent Hub Manager for AIX provides centralized management on hubs running NetView for AIX. 800-426-3333.

Xyplex announced LAN switching for its Network 9000 Routing Hub for less than \$500 per Ethernet port. The three-phase plan begins with SwitchPlane (\$1,500), the company's multichannel switching architecture. Phase 2 includes the 600 Series modules (\$7,995 to \$11,995), which support 10BaseT, 10BaseFL, FDDI, and Fast Ethernet. The 500 Series modules (\$8,990 to \$17,990), also part of Phase 2, support ATM, FDDI, and ISDN. Phase 3 revolves around switching and routing within virtual LANs. 508-952-4700.

LANNET Data Communications' new hub module provides 100-Mbps Fast Ethernet throughput for server-to-server or hub-to-client connections. Designed for its MultiNet hubs, the LFE-100 LANswitch module (\$5,995) plugs into the hub's 1.28-gigabit-per-second cell switching bus. Management is provided via any SNMP-compliant application such as LANNET's own MultiMan management package. 800-552-6638.

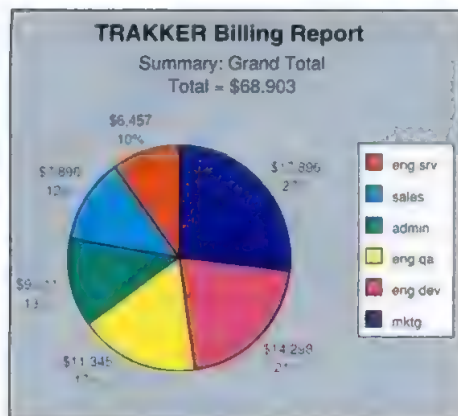
Bytex enhanced its Series 7700 hub with the addition of Ethernet port switching. The Port Switched Ethernet (PSE) module (contact vendor for pricing) allows network managers to create virtual LANs—up to 144 on a single hub. The process is controlled by the company's own Bytex Series 7700 Network Management System. 800-232-9839.



MAIL CALL: MobileWare lets users access their cc:Mail while they're on the road.

NEW

Trakker Automates Cost of Network Usage



BILL ME: Trakker renders detailed statements showing network usage.

Concord Communications addresses billing and bottlenecks with two new applications for its Trakker network management system. With the Billing and Network Balance applications, network managers can charge network usage to specific departments or projects and identify enterprise-wide bottlenecks on the network, respectively.

The Billing application generates statements based on network utilization, including peak and off-peak charges. The Network Balance application locates network loading problems, providing reports that identify segments or rings that exceed user-defined thresholds.

► **Billing (for Trakker).** List price: \$7,500. **Network Balance (for Trakker).** List price: \$3,000. Concord Communications Inc., 33 Boston Post Road West, Marlboro, MA 01752; 508-460-4646.

Circle 961 on reader service card

IMPROVED

Intel Moves Forward with Backup

Intel Corp.'s StorageExpress system provides a centralized backup solution for the enterprise environment—NetWare and now Unix and Windows NT servers and workstations. In addition to its multi-NOS support, Version 1.4 provides the network manager with a variety of new features for automating tape backup and data protection. The backup server can also be integrated with network management systems such as Intel's own LANDesk Manager and Novell's NetWare Management Systems.

► **StorageExpress, Version 1.4.** List price: \$5,995 and up (depending on configuration). Intel Corp., 2200 Mission College Blvd., P.O. Box 58119, Santa Clara, CA 95052-8119; 800-538-3373.

Circle 962 on reader service card

NEW

BBN Offers Turnkey Internet Server

Stressing ease of use and ease of manageability, **BBN Internet Services Corp.** (a subsidiary of Bolt Beranek and Newman) announced its plug-and-play Internet Server. The Unix-based server uses a GUI-based interface for server administration, enabling authorized users to add personal accounts, create electronic mailing lists, and access Gopher and WWW services with ease. The administration software runs on Macintosh or Windows desktops, and it supports Macintosh, OS/2, Unix, and Windows clients.

The BBN Internet Server is a turnkey solution that comes preconfigured for easy installation on an Ethernet network. If you're already connected to a service provider, all you have to do is plug it in. The server is an Intel Pentium-based machine that includes 16MB of RAM and a 500MB hard disk.

► **BBN Internet Server.** List price: \$9,895. BBN Internet Services Corp., 150 Cambridge Park Dr., Cambridge, MA 02140; 800-331-2266, 617-873-500.

Circle 963 on reader service card

BRIEFS

ROUTERS

Cascade Communications Corp.

announced fault-tolerant frame-relay features for its B-STDx 9000 router. The Data Center failure-recovery component detects points of failure in the data center and restores them at the backup data center. Access-failure recovery is provided by an ISDN Primary Rate Interface module. And trunk failures are detected using fault-tolerant trunking software. 508-692-2600.

Nupon Computing Corp.'s

new dial-up router features a variety of protocols for built-in communications capabilities. The LTS-HTI supports the TCP/IP, IPX, and LAT protocols, as well as remote access, modem and print server functions. The unit is available with 4 ports (\$1,995) or 16 ports (\$3,195). 714-258-8622; fax, 714-258-0812.

ADAPTERS

CNet Technology's

objective seems to be ease of installation as demonstrated in the design of its new plug-and-play, jumperless PCI Ethernet card. The CN970EBT (\$219) is compliant with the 32-bit PCI 2.0 specification, and it supports both BNC and UTP connections. The card ships with drivers that support a variety of operating systems such as Microsoft LAN Manager, Windows for Workgroups and NT, NetWare 3.12 and 4.0, and OS/2 LAN Server. 800-486-2638.

Emulex Corp.

announced the DCP-286i-SBC (\$995), a multiport, configurable WAN adapter. The single board features much of the same functionality found in motherboard/daughterboard designs. The two I/O ports can be configured to handle any of the seven supported interfaces such as RS-232, RS-422, RS-423/485, RS-530, X.21, and V.35. 800-854-7112.

Paving the Way for LANs over ATM

LAN Emulation makes ATM viable. Best of all, many vendors are already behind it.

By Eric M. Hindin

Fantasies of massive bandwidth to the desktop took a step closer to reality this past fall when the ATM Forum—the de facto worldwide authority on ATM standards—ratified a LAN Emulation standard. With this new specification you can run your existing networked applications across an ATM network and tie that network into other existing LANs.

One of the key functions of LAN Emulation and the just-approved standard, called L-UNI (LAN Emulation User-to-Network Interface), is support for network broadcast messages. Broadcasts—the linchpins of electronic mail, groupware, and other critical LAN applications—are messages that are sent to every node. Much like the phone network, ATM can carry messages to a single node only and so cannot inherently support broadcasts. With LAN Emulation, however, software is used to provide support for broadcasts, so ATM clients can communicate with each other—and with non-ATM clients through a bridge or router—using LAN protocols.

TECHNOLOGY BREAKDOWN

LAN Emulation actually defines three core capabilities to allow ATM clients to use LAN protocols: determining and establishing connections to a destination ATM address, encapsulating network data within ATM cells, and enabling ATM to carry broadcast (one-to-all) and multicast (one-to-many) transmissions. LAN Emulation also serves as the basis for ATM “value-added” functionality,

such as virtual networking—using software to define a segment, and thus making it easier to add and remove users from the network.

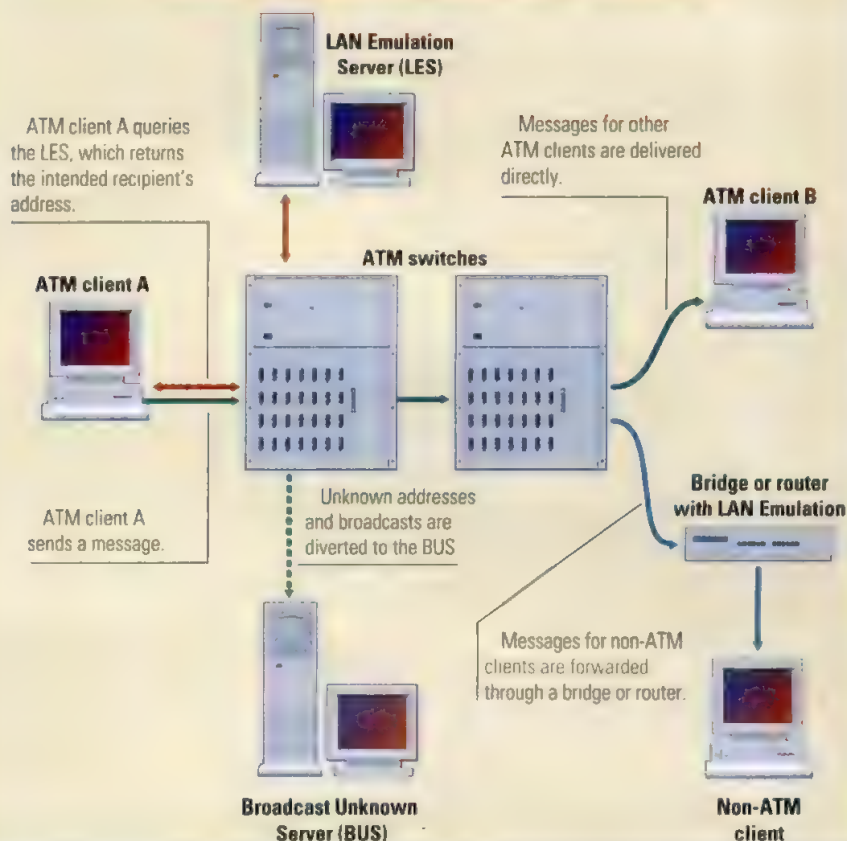
LAN Emulation is implemented by three network components: the LAN Emulation Client (LEC), the LAN Emulation Server (LES), and the Broadcast Unknown Server (BUS); see the diagram below.

The LAN Emulation Client (LEC) is a

software driver that runs in a network client. Through the driver, the ATM network appears as a regular Ethernet or Token-Ring LAN. This keeps the applications unchanged. But while the driver looks like a vanilla network node, it initiates vastly different communications processes. For example, while LAN-attached clients transmit messages the same way whether a recipient is local or remote (it's up to a bridge or router to step in if the message is destined for a remote location), an ATM client sends messages directly to intended recipients.

The LEC determines this direct path by querying a LAN Emulation Server (LES). The LES maintains lists of ATM and LAN addresses for all the network nodes. Upon receiving the query the LES

LAN Emulation at Work



looks up the appropriate address and sends a response.

Once the ATM address is determined, the ATM client establishes a virtual circuit through the ATM network using standard signaling protocols (User-to-Network Interface Q.2931). If the LES cannot respond to the query—as in the case of a broadcast—the message is directed to the *Broadcast Unknown Server* (BUS). The BUS maintains lists of virtual LANs on the ATM network. When a BUS receives a broadcast message, it retransmits the message to every member of the sender's virtual LAN.

A similar process occurs when an ATM client attempts to communicate with a non-ATM client whose address is unknown to the LES. In this case, a bridge or router acts as the LEC and provides a path to non-ATM nodes by performing addressing, signaling, and the other functions described above on behalf of each LAN client.

Since it is impossible for the bridge or router to contain the address of the poten-

tially tens of thousands of nodes connected to the router, these addresses cannot be dynamically registered with the LES. Instead, the bridge or router forwards an address request from the BUS to all attached LAN clients. Each client responds with its address; each address is added to the BUS or message sender's address database.

LAN Emulation may seem like an extremely complicated approach to provide what Ethernet and Token-Ring already deliver. Also, you may wonder whether high-speed LANs such as Fast Ethernet, FDDI, or 100VG-AnyLAN aren't better and simpler options for ATM. LAN Emulation, however, really doesn't pose any significant problems.

For one thing, the LES and BUS are no more complex than existing bridges or routers. More important, by utilizing centralized servers that track all network nodes and changes, LAN Emulation opens the door to a host of capabilities that today's networks lack. Virtual networking and much-improved security are two examples.

THE SIGN-UP SHEET

Today, such vendors as Fore Systems, IBM, and Bay Networks (SynOptics and Wellfleet) already provide proprietary LAN Emulation that closely mimics the ATM Forum's forthcoming standards. All three are planning to upgrade their software as soon as the ATM Forum's standards are complete.

Still, all is not complete. More standards are needed to define how to implement the LEC, LES, and BUS. One such standard, LENNI (LAN Emulation Network-to-Network Interface), is due within a year. LENNI will specify how to implement LAN Emulation across two ATM networks.

This could be the make-or-break year for ATM. Much of the technology's success will hinge on LAN Emulation. After all, would you really want a network that couldn't speak with your LAN?

ERIC M. HINDIN is a senior consultant with Strategic Networks Consulting, which publishes *The Internetwork Advisor*, a monthly newsletter focusing on internetworking implementation issues.

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Read the Darned Manual

Did you know that full solar eclipses are a mathematical freak of nature? They occur because the ratio of the moon's size to that of the sun and the relative distance of both from the earth is just right. It's possible that I actually learned this in some ancient science class—but if so, it didn't stick. Not until I saw a diagram in a TV report of the full eclipse visible in the Southern Hemisphere last fall.

Learning is often like that, and the experience made me think about the strategies we computer professionals use to expand our internal information bases.

TAKE A MANUAL TO LUNCH

It is both trite and true to state that nobody reads manuals. This is not to say that we don't dip into manuals from time to time for one reason or another. Indeed, sooner or later when you're trying to figure out something, somebody is bound to tell you to read the %@\$#!& manual. To which you will no doubt reply that you haven't the time. (If by some remote chance you *have* actually read a computer-related manual from start to finish, please e-mail me with the name of the manual and an explanation of your bizarre behavior. I may emblazon your name and its in print.)

I certainly share this well-based aversion to reading manuals. It's not just a question of their being poorly written or boring or far too long. Most of us don't have the time and couldn't absorb more than a fraction of what we'd read if we did.

Unfortunately, not reading manuals can be bad for one's health—or at least one's career. Professionals who have been in this business a while all too often cut corners when it comes to new products or new product versions. (I include myself in this group.) We install the product, and we figure out how to do whatever we need to do or determine how the release seems different from earlier versions. Especially when the software in question is a NOS, we then proceed to implement only those new features that seem useful and that won't cause any headaches. After a couple of product generations, we are likely to have ignored or forgotten an awful lot of "new" features that might be useful today.

I was recently reminded of this when looking through the NetWare 3.11 manuals for details on an obscure function I'd not been asked



*By Diane
Danielle*

about in years. While seeking that bit of trivia, I stumbled across an option to a function that I hadn't known existed and started wondering what other gems might be hidden between the covers.

The pop-up start-up tips being implemented in a wide range of software applications are, in effect, an automated way of taking advantage of this type of learning. But pop-up tips don't make sense when the subject is a network operating system—after all, a good one shouldn't reboot very often.

What to do? Simple. Systematize the look-up phenomenon. Next time you're on hold for your favorite vendor's technical support or you've just gotten a telephone call from a nonstop talker, grab an operating system manual and open it up at random. You never know what you might learn.

CONFERENCES

What kinds of seminar topics do you choose when you attend a conference? Subjects you know little or nothing about, right? Nothing could be more reasonable. You're there to learn, and you're paying for the privilege.

But this can sometimes be shortsighted. Often we know *how* to do something but not *why*; or we know one way to accomplish a task but not another. I've rarely been on a seminar panel and not learned something new from at least one of the speakers, no matter how familiar I was with the topic in question.

So from time to time, attend a seminar on a subject that isn't brand-new to you. At worst, you'll come away feeling brilliant because you know more than the presenters. At best, you'll discover something new.

GO VISITING

Another good way to pick up useful information is to go visiting. Look at how somebody else has set up a PC or a network. Talk with other networking folk at user group meetings or conferences. Sometimes you'll decide your way is better, at least for your environment; often you'll discover a trick or a utility that will solve a troublesome problem.

Serendipity doesn't happen by chance. □



*Not reading manuals can
be bad for one's health—or
at least one's career.*

DIANE DANIELLE is an independent networking consultant in Berkeley, California. She can be reached on CompuServe at 70020,645 or MCI Mail at 383-1159.

Why Bother with ISDN?

David, after I took a few editorial pokes at the availability of ISDN service within the U.S., I received a targeted stream of ISDN success stories from public relations agencies. Apparently, several corporate members of the ISDN community want to change the perception that the ISDN service providers are playing hard to get. The most poignant call came from a person who spends all day installing ISDN lines for NYNEX and who wanted me to know that the company is serious about making ISDN a success—even in Manhattan.

The most interesting change is in how the local exchange carriers discuss ISDN. These companies have finally retrained the folks who could previously only discuss Caller ID and digital voice services. Caller ID has gone on to become a tiny part of computer telephony integration, and I haven't even seen an ISDN voice phone in a year or so. But what is the ISDN "killer application?" Why should the people reading this column even consider ordering ISDN service?

At Fall Comdex, Microsoft's Mike Maples said, "Remote LAN access is the ISDN killer app." I agree with that assessment 100 percent. In terms of the number of companies entering and already playing the game, buyer interest, and the impact on how you work, remote LAN access is right up there with multimedia as a hot market. Companies such as DigiBoard and Combinet are leading the technology development in a spirit of competitive cooperation. Microsoft and Novell both view remote LAN access capabilities as critically important to the success of their network operating systems.

In my opinion, the best uses of remote LAN access are beyond the capabilities of analog modems—even the new V.34 modems. When you connect to a LAN through an analog modem you have to plan for the slow line—it affects how you work. But subjectively, an ISDN connection to the LAN isn't much different from a local connection, and you work the same way across the ISDN link as you do across a local connection. The faster connection makes a big difference in your productivity.

So, in response to the complaints, here's my latest tune: Today, ISDN is almost always available (at some price). If you are a typical corporate over-achiever, remote access to the LAN using ISDN will improve your chances for success—go for it!



Frank Derfler:
*Believe me,
remote LAN access
using ISDN will
improve your chances
for success.*



David Greenfield:
*Don't be so shallow,
Frank. The story isn't
remote access. Remote
desktop is where the
hot action is.*

Frank, you couldn't be more right. ISDN is important. But not only for the reasons that you state. Remote access is one component of the ISDN story. The bigger picture is the remote desktop. Here's where the action is really hot. With ISDN I can extend my corporate office to anywhere in the country. The tools that enhance that experience—videoconferencing, computer telephony integration, and on-line access—are the ones I think are key.

With ISDN I can get a Internet pipe fat enough to handle any of those World-Wide Web graphics. Just call up, for instance, Performance Systems International for the service or Ascend Communications for the LAN router to make the connection.

But don't forget, Frank, that ISDN is just one part of the

development of computer telephony integration. With tight integration of the telephone and data networks, all sorts of functionality becomes possible. I won't bore you with the same list of applications that I've recited before—you know, things like the universal mailbox, software-based telephones, screen pops, all sorts of intelligent call routing (oops, there we go again). Suffice it to say that ISDN is the delivery mechanism for integrating voice and data.

One of the best computer telephony applications is video-

conferencing. As you know, Frank, the piles of videoconferencing gear are growing here at *PC Magazine*. We use the AT&T Vistium system to connect the coasts over ISDN several times a day, and the Intel ProShare system also gets a workout. Of course, the two products don't work together but we're looking forward to getting Vivo Software's product, which is supposed to be interoperable with the Vistium. We value the productivity increase we get from videoconferencing.

As I look in my crystal ball, I see direct sales through videoconferencing as an important ISDN application that will emerge in the next 12 to 18 months. At first, corporate accounts will link to their travel bureaus, advertising agencies, lawyers, and accountants through ISDN. But very quickly, some smart salesperson will spot the potential for selling Hawaiian vacations, electric shavers, salad choppers, exercise machines, and high-end, must-have items across a personal video link. □



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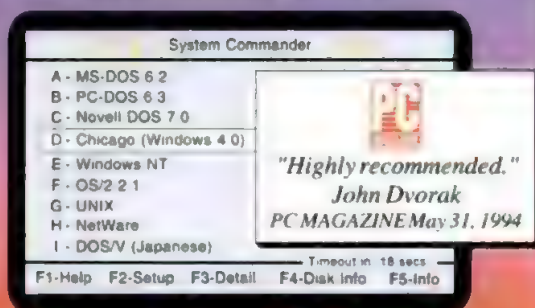
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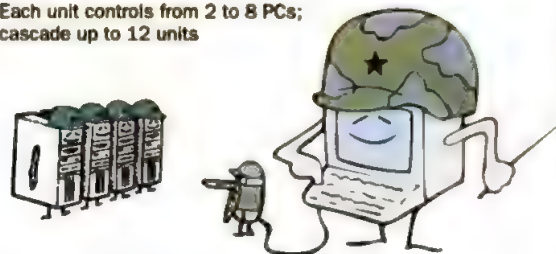
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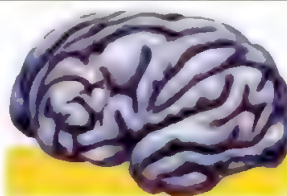
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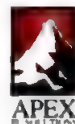


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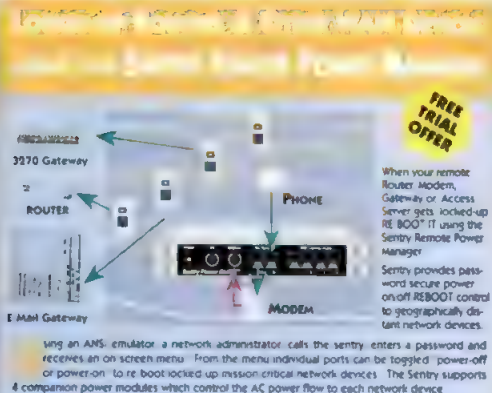
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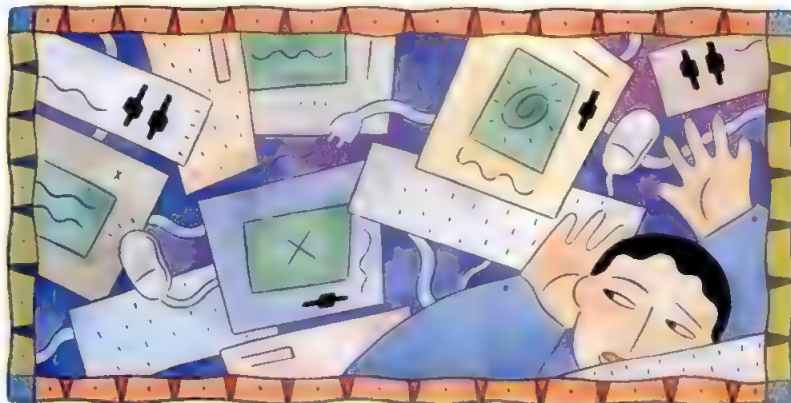
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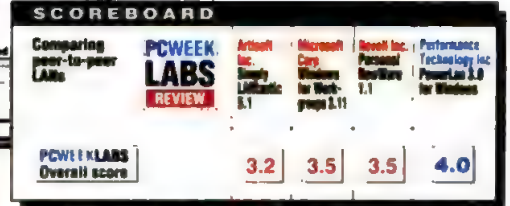
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User-to-User

BY NEIL J. RUBENKING

Arranging Program Manager Group Windows

Selecting Tile from Program Manager's Window menu automatically sizes and arranges your program groups, but I think few users realize that the groups are organized so that the most recently activated group occupies the upper-left corner of the workspace, while the least recently activated group appears closer to the bottom-right corner. Once you know this, it's easy to force the groups to appear in the order you want. Click on each in turn, ending with the one you want to appear in the upper-left corner of Program Manager's workspace, then select Tile from the Window menu. To save the new configuration without leaving Windows, hold down Shift and click on Exit in the File menu.

*Clay Lansdown
Bow, New Hampshire*

► **PC MAGAZINE:** This handy tip applies only to open group windows, not group icons, so first you'll need to open any groups you want arranged. (You can make those groups as small as you'd like, though, since the tile operation will probably change their sizes anyway.) Now click on each of the groups you've

opened, but in reverse of the order you want them to appear in on the screen. When you select Tile, the open groups (assuming there are four or more) will be arranged top to bottom and left to right. That is, the second most recently used window will appear directly below the first, and so on.

Holding Shift while selecting Exit from the File menu will save this new configuration even if Program Manager's Options/Save Settings on the Exit menu item isn't checked. In fact, you might want to remove the check if it is there to prevent other changes from being saved when you exit Windows.

Here's another tip you may want to try. Make sure there's a check next to Auto Arrange in Program Manager's Options menu, then adopt this new habit: Before running a program, always drag its icon to the top left corner of its

group window. Auto Arrange will rearrange the other icons to make room. Over time, the icons in each group window will become roughly sorted from most frequently to least frequently used, with the most important items in the top row of icons in each group. Again, you can hold down Shift and select File/Exit to save the layout once you have it to your liking.

Extra Environment Space

DOS gives a newly executed program enough environment space to hold existing environment variables (e-vars), but little more. This can cause problems if you shell out to DOS and try to run a batch file that sets and uses e-vars, since a lack of environment space may prevent some (or all) of the variables from being set. Unfortunately, even increasing the environment size (using the SHELL command in CONFIG.SYS) fails to make DOS allocate more environment space to a newly executed program. As a solution, I define two e-vars in AUTOEXEC.BAT:

```
SET PROG=
SET EnvReserve=Space reserved
to expand the EKE's Env. The
EKE can reclaim this space.
```

Any application I use starts from a batch file that sets PROG to the program name just before invoking the application and clears PROG just afterwards. I also put the line

```
If Not '%Prog%'==' ' Set EnvReserve=
```

into any batch file that sets e-vars. If PROG isn't empty, a program is running already and environment space will be limited, so this statement clears the variable EnvReserve, releasing its space (84

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```
@ECHO OFF
REM CTTY NUL suppresses "Out of environment space" messages
CTTY NUL
FOR %%v IN (A B C D E F G H I J) DO SET %%v$$$=XXXXXXXXXX
CTTY CON
```



Figure 1: FILLENV.BAT fills up to 160 bytes of unused environment space with dummy variables. Other batch files can delete these variables to gain environment space.

```
@ECHO OFF
FOR %%v IN (A B C D E F G H I J) DO SET %%v$$$=
```



Figure 2: CLEARENV.BAT clears the dummy variables created by FILLENV.BAT.

bytes in the example above) for use by the batch file. When the batch file terminates, control returns to the program you shelled out of, so the secondary command processor and its copy of the environment are dumped, thus restoring EnvReserved's original value for the next shell to DOS.

Rees Acheson
Alstead, New Hampshire

► **PC MAGAZINE:** Making environment space available through the use of placeholder environment variables isn't a new tech-

nique, but the unique contribution here is the clever method for automating the process.

There's one disadvantage to this technique that I must point out: The environment space occupied by EnvReserved is unavailable at the regular DOS prompt. To solve the problem, you can completely fill the environment with dummy variables just before running each application, and clear the variables afterward. FILLENV.BAT (Figure 1) attempts to create ten environment variables named A\$\$\$ through J\$\$\$, each of

which occupies 16 bytes. Since there may not be enough environment space to create all of the variables, the "Out of environment space" messages are suppressed using the CTTY NUL command. Figure 2, CLEARENV.BAT, clears those ten variables. You can, of course, adjust the number and size of the variables to fill the available environment space on your particular system. Now a batch file to run a particular program might look like this:

```
C:
CD\MYPROG
CALL C:\BAT\FILLENV
MYPROG.EXE
CALL C:\BAT\CLEARENV
```

Environment-using batch files that might be run from within a DOS shell should simply start with CALL C:\BAT\CLEARENV.BAT. Naturally, if you store your batch files in a directory other than C:\BAT, you should change this statement to reflect the appropriate path. □

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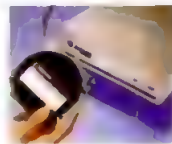
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Tutor

BY JEFF PROSISE

Much Ado About Objects

Lately, everyone is talking about objects. You hear about object-oriented programming languages, object-oriented operating systems, object-oriented user interfaces, even object-oriented applications. The term *object-oriented* is a favorite buzzword for marketers, who perhaps feel that their products will seem antiquated if they can't be touted as object oriented. Ordinary users are to be forgiven for becoming jaded by the term, because these days it's increasingly difficult to sort out fact from fiction and tell what's object-oriented and what's not.

So what does object-oriented really mean? What is an object? Rather than settle for abstract definitions, let's look at two types of objects that are in actual use today. First, we'll look at objects in the C++ programming language, which uses objects as the fundamental building blocks for programs. Second, we'll look at objects in OLE (Object Linking and Embedding) version 2, which uses object-oriented interfaces to allow disparate Windows applications to work together as one. Finally, we'll discuss what this means for end users—and some of the wonderful things that object-based technologies will bring to our desktops in coming years.

OBJECTS IN C++ In C++, an object is a collection of related variables and functions bound together to form a higher-level entity. The variables define the state of the object, while the functions define the actions that can be performed on the object. Objects begin with class definitions, which tell the compiler what variables and functions make up a particular type of object. You can't build a house without a floor plan. Likewise, you can't

create an object without a class definition.

Suppose, for example, that a C++ programmer wants to create a simple window class that allows rectangular windows on the screen to be dealt with as objects. Four integer variables define a window's state: *x* and *y*, which hold the *x*- and *y*-coordinates of the window's upper-left-hand corner, and *cx* and *cy*, which hold the window's width and height, respectively. In addition to these variables, which C++ programmers refer to as *member variables* because they are members of the class, the programmer also wishes to create three functions that operate on a window object. The first, named *MoveWindow*, moves the window to a new location. The second, *SizeWindow*, changes the window size. The third, *DrawWindow*, draws the window on the screen. Since these functions are also members of the class, they're termed *member functions*.

The class definition for such an object might look like this:

```
class Window
{
private:
    int x, y;
    int cx, cy;
public:
    void MoveWindow (int newx, int newy);
    void SizeWindow (int newcx, int
newcy);
    void DrawWindow (void);
};
```

In C++, as in C, the keyword *int* stands for "integer" and defines a variable that holds integer values. As used here, the keyword *void* indicates that the member functions do not return any values and that *DrawWindow* requires no input. The code for the member functions appears elsewhere in the program. The *MoveWindow* function would look like this:

```
void Window::MoveWindow (int newx,
int newy)
{
    x = newx;
    y = newy;
    DrawWindow ();
}
```

All *MoveWindow* does is change the values of *x* and *y* that hold the window's current position (using the new values passed in to the function as *newx* and *newy*) and call *DrawWindow*. The values of *x* and *y* are specific to the object instance for which this member function was called.

Presumably, *DrawWindow* uses the member variables *x* and *y* to determine

where on the screen to draw the window and *cx* and *cy* to determine the window's extents.

Creating a window object from the class is now a simple matter of treating the class like a built-in data type and declaring an instance of it. The following statement creates a window object named *MyWindow* by declaring an instance

of, or *instantiating*, the *Window* class:

```
Window MyWindow;
```

Once *MyWindow* is created, the program that created it can set the window's size and position by calling *MyWindow*'s *MoveWindow* and *SizeWindow* member functions:

```
MyWindow.MoveWindow (64, 128);
MyWindow.SizeWindow (256, 256);
```

Similarly, the creating program can draw the window on the screen by calling

Rather than settle for abstract definitions, the Tutor takes a close look at two kinds of objects in current use: C++ objects and OLE 2.0 objects.



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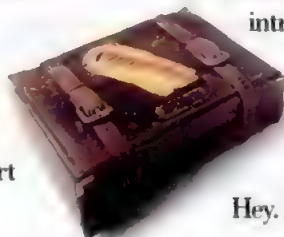
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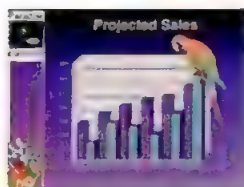
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DrawWindow:

```
MyWindow.DrawWindow ();
```

Significantly, the program cannot access the *x*, *y*, *cx*, and *cy* variables directly, because they were declared private in the class definition. A statement such as

```
MyWindow.x = 16;
```

would be summarily rejected by the compiler. The private member variables can only be changed by calling *MoveWindow* and *SizeWindow*, which enjoy access to the class's data members because they, too, are members of the class. The member functions can be accessed from the outside because they were declared public. Had they been declared private, they, like the class's data members, would be hidden from view. An object with private member functions wouldn't be of very much use, because you wouldn't be able to do anything with the object once you created it. But sometimes it's useful to declare some of the member functions private so only other member functions can use them.

By allowing related code and data to be grouped together, C++ fulfills one of the three fundamental criteria for an object-oriented programming language: *encapsulation*. The other two criteria are *inheritance* and *polymorphism*, and C++ supports those, too. Inheritance is the freedom to derive new classes from existing classes. In C++, a derived class inherits the member functions and variables of its parent (the base class) and then adds functions and variables of its own. For example, the statement

```
class Pushbutton : public Window
{
private:
    char title[80];
public:
    void SetTitle (char *newtitle);
};
```

derives from the *Window* class a new class called *Pushbutton* describing push-button windows—windows that look like push buttons and are labeled with text such as “OK” and “Cancel.” The *Pushbutton* class contains all the member functions and

variables of the *Window* class by virtue of inheritance, so it's perfectly legal to call a *Pushbutton* object's *MoveWindow* function to position it on the screen. And because the derived class's class definition defines a *SetTitle* function, it's also legal to call *SetTitle* to change the button label.

Polymorphism is the ability to call an object's member functions without knowing the object's exact type. One problem with the *Pushbutton* class in the previous paragraph is that if *DrawWindow* is called, *DrawWindow* will draw a conventional window rather than a push button-style window. Why? Because the *Pushbutton* class inherits the *Window* class's *DrawWindow* function, which draws a regular rectangular window. C++ therefore allows derived classes to provide their own *DrawWindow* functions. More importantly, it allows the compiler to invoke the appropriate version of *DrawWindow* when all that's known about the object is that it's a window object of some type, whether a *Pushbutton*-type window or some other window type derived from the *Window* class. One practical implication of this is that given a list of window objects of various types, the program that created them could command each of them to draw without knowing whether a particular object was a push button or a window of some other kind.

C++ is not an object-oriented language from the ground up (such as Smalltalk) but a group of facilities added to C—a procedural programming language in which data and code are separate. Conceptually, it's easier to think in terms of objects and the functions that operate on them than to try to make sense of hundreds, perhaps thousands, of unrelated functions. In addition, C++'s data-hiding capability reduces the likelihood that a program bug will corrupt a variable in an unrelated part of the program. C++ class libraries such as the Microsoft Foundation Classes (MFC) and Borland's Object Windows Library (OWL) make Windows programming somewhat easier by replacing hundreds of Windows API functions with logically grouped member functions.

OBJECTS IN OLE 2 OLE 2 is a set of protocols that allows two Windows applications—or two parts of the same application—to communicate using an object-oriented interface. Today, OLE 2 is the

basis for some pretty amazing tricks, such as word processors that transform themselves into spreadsheet programs when the user double-clicks a spreadsheet stored inside a word processing document. Tomorrow, OLE 2 may be the foundation for Windows itself, transforming Windows into a truly object-oriented operating system and lending critical support to Microsoft's document-centric view of the future.

An OLE 2 object is similar to a C++ object in that it is a logical grouping of code and data. An OLE object's data members are hidden, just like the private data members in a C++ object. The code part of the object—the functions that act upon the object—is organized into subgroups of semantically related functions called *interfaces*. Every OLE 2 object implements at least one interface—*IUnknown*—and most implement more. The *IUnknown* interface contains three functions, which are called *methods* in OLE 2 parlance: *QueryInterface*, which returns information about other interfaces (if any) that the object supports; *AddRef*, which increments the object's reference count (the number of *clients* that are using the object); and *Release*, which decrements the reference count and frees the memory used by the object when the reference count reaches zero. Programs can query an object to determine the interfaces that it supports and then call the methods defined by those interfaces to manipulate the object.

IUnknown is only one small part of the many-faceted OLE 2 object model. In all, 62 different interfaces are defined, supporting a diverse assortment of operations ranging from drag-and-drop data transfers to in-place object activation. Familiarizing oneself with all these interfaces and the hundreds of methods that they comprise is not unlike learning what contribution every nut and bolt in an automobile makes to the car's overall operation. Fortunately, MFC places C++ wrappers around many commonly used OLE 2 interfaces and to some extent obviates the need to understand all the nuts and bolts of OLE 2. This is perhaps MFC's greatest contribution to Windows programming: not that it implements data hiding and imposes organization on the myriad API functions that Windows

supports, but that it supplies "canned" implementations of OLE 2 that you can plug right into your programs. The best code is code that you don't have to write yourself.

So how are OLE 2 objects used? Suppose a programmer wants to enable an application to accept data dragged over from other applications. To do so, he creates in his application (the *drop target*) an object that supports the IDropTarget interface. The application that's doing the dragging and dropping (the *drop source*) implements an IDropSource interface and furnishes an IDataObject interface for the data. All three interfaces are described in detail in the OLE 2 specification. To begin dragging, the drop source calls an OLE 2 function that manages the drag-and-drop process and continually monitors the position of the mouse pointer. When the pointer moves over the drop target window, OLE 2 calls IDropTarget's DragEnter and DragOver methods so the target is apprised of what's going on. When the drop occurs, OLE 2 calls the drop target's IDropTarget::Drop method, and the drop target pastes the data into the document represented by the receiving object. Figure 1 illustrates the relationship between the drop source and drop target with interfaces represented by "jacks" extending from the various objects and the dynamic link library OLE2.DLL bridging the gap.

What the IDropSource and IDropTarget interfaces really represent is a standard and agreed-upon means for the drop source and the drop target to communicate with each other, using OLE itself as a go-between. OLE 2 drag-and-drop is superior to the simple drag-and-drop mechanism built into Microsoft Windows, Version 3.1, because it supports the transfer of virtually any type of data. Windows 3.1 drag-and-drop, by contrast, supports filenames only. Drag-and-drop is only one small part of OLE 2, but it's a great way to understand what OLE 2 is all about. And the use of objects, as well as object-oriented interfaces and methods, is a theme that

is consistent throughout the OLE 2 programming model.

THE FUTURE These descriptions may seem a bit dry if you're a nonprogrammer, but rest assured that objects hold implications for end users, too. Object-oriented programming languages and operating systems theoretically enable programmers to write applications with fewer bugs. That's something anyone who experiences daily doses of Windows 3.1 GPFs (general protection faults) can appreciate. Most

OS/2's Workplace Shell incorporates many of these features today, but Windows 95 will go much further in allowing third parties to extend the shell. Using OLE-like interfaces and methods, programmers will be able to add verbs to context menus, do on-the-fly customizations of icons representing document objects, and much more.

And what about component software? Today we run monolithic application programs such as Microsoft Word for

Windows and Lotus 1-2-3, Release 5, for Windows that are geared for a specific purpose. OLE 2 blurs the boundaries among these applications by allowing 1-2-3, for example, to fold itself into a Word window when a spreadsheet object is activated inside a Word document. If component software takes hold, we'll soon stop thinking about applications altogether and think instead about documents. A document won't necessarily be a word processing or spreadsheet document; it might contain elements of both, and as we edit objects in that document, the

appropriate applications will be invoked behind the scenes. Rather than buy a word processor application, you might buy a word processor component that lets you do word processing inside your documents. Better still, you might buy separate editing and spell-checking components and build the word processor of your dreams. The idea behind component software is to compartmentalize the functions of monolithic programs into software components that stand alone yet work together. To make that happen, we must have standards such as OLE (or a competitor such as OpenDoc).

Time will tell how much of an impact objects will have on a software industry that is currently groping for a better way to do things. To the purist, adding yet another layer of abstraction to already complex operating systems and application programs may seem like a terrible waste of good processor time. But the greater risk is that software might not be able to progress without embracing objects. □

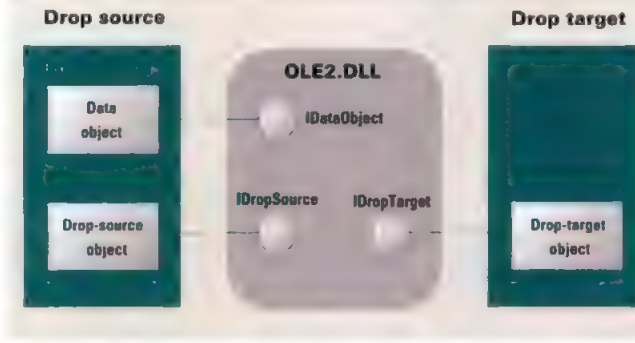


Figure 1: OLE 2's drag-and-drop model consists of a drop source containing a data object and a drop-source object, a drop target containing a drop-target object, and the OLE 2 dynamic link library bridging the gap between them. IDataObject, IDropSource, and IDropTarget are interfaces (groups of related functions) supported by the objects.

GPFs are caused by drivers and application programs that are buggy because Windows programming is so darned complicated. Anything that reduces the tedium of Windows programming is bound to reduce bug counts, too.

We'll also see more programs that cooperate with each other and understand each other's data formats. OLE 2 is already enabling this to happen with the handful of programs that are OLE 2-enabled.

But perhaps the greatest significance of objects for everyday users will lie in the areas of user interfaces and component software. Windows 95, the forthcoming release of Windows, will feature an altogether new user interface that relies heavily on the concept of objects. Basically, everything you see on your screen will be an object, whether a file object, an application object, or something else. Even the desktop itself will be an object. To perform an operation on any object, you'll click the object once with the right mouse button and Windows will display a context menu listing all the options.

Toolkits

BY SAL RICCIARDI

Full-Text Fuzzy Search for FoxPro

To search large amounts of free-form text in a database, you usually have to buy a specialized database management package. But users of Microsoft FoxPro can get PhDbase III, Version 3.2 (\$295), from Korenthal Associates, to add full-text index and search capabilities to their applications and to interactive FoxPro. It also adds sophisticated phonetic fuzzy search ("sounds like") capabilities to FoxPro's query repertoire.

PhDbase is an add-on library that comes with files for both the DOS and Windows versions of FoxPro. Both versions work identically, so you don't have to learn different techniques for each environment. There are no royalties.

PREPARING TO SEARCH All operations in PhDbase (including indexing) are invoked by supplying the appropriate arguments in calls to the `phd()` function. This consistent API interface makes the product easier to learn.

To implement PhDbase's text-retrieval technology, you first build a PhDbase index file, a special .PHD file that (if you choose) indexes every word in the columns you specify. Once the index is available you can search for matches by calling PhDbase's `phd()` function.

You can index multiple columns and expressions and can include character, memo, date and numeric fields, character expressions, and even external files whose names are specified in a FoxPro table. PhDbase hooks into FoxPro to update your indexes automatically. It adds an index tag to the structural compound-index file, so that FoxPro automatically calls PhDbase during index updates.

You have considerable flexibility in

fine-tuning the index. For example, you can tell PhDbase to place entire words in the index or only word roots (the default), in which case PhDbase strips certain common English suffixes such as "ing" from the index. That way the words "cook," "cooks," "cooked," and "cooking," for example, would all match on "cook."

You can also exclude words by placing them in a word-exclusion list. PhDbase automatically excludes common words ("a," "the," and so on) and words that appear too frequently in your database. Both capabilities can be fine-tuned or turned off.

PhDbase's relatively fast indexing produces a tightly compressed index file. In one test case, an index created using the full-word option (which results in the loosest compression) and including all of the character and memo fields in a table required only about a fourth of the disk space occupied by the table itself. In another test case, a root-word index on the FoxPro for DOS help file required only a

tenth of the disk space used by the help file.

Once the index file is created, you can use PhDbase's search features to find matches on complete or partial words and expressions. Complex Boolean, proximity (within *n* words), and wildcard searches are supported. Using the LIKE operator changes a search into a fuzzy search, which lets you locate records even when words are misspelled. PhDbase uses a proprietary fuzzy-search scheme that improves upon Soundex.

PhDbase supports much of FoxPro's SQL SELECT syntax, as well as a simpler alternative search syntax, and can send the query result to a number of output destinations. The result can be ordered by the number of hits so that the most relevant record appears first. The product performs well—searches return their results quickly. Fuzzy searches are slower than normal searches, but only slightly.

PhDbase's documentation lacks a tutorial, and the product is missing an effective sample program. These quibbles aside, PhDbase III adds a lot of flexibility to FoxPro's search capabilities and is a useful addition to almost any FoxPro developer's toolkit.

► **PhDbase III, Version 3.20.** List price: \$299.95. Requires: *Microsoft FoxPro for DOS 2.5 or later or Microsoft FoxPro for Windows 2.5 or later.* Korenthal Associates Inc., 511 Ave. of the Americas #400, New York, NY 10011; 800-527-7647 (orders only), 212-242-1790; fax, 212-242-2599.

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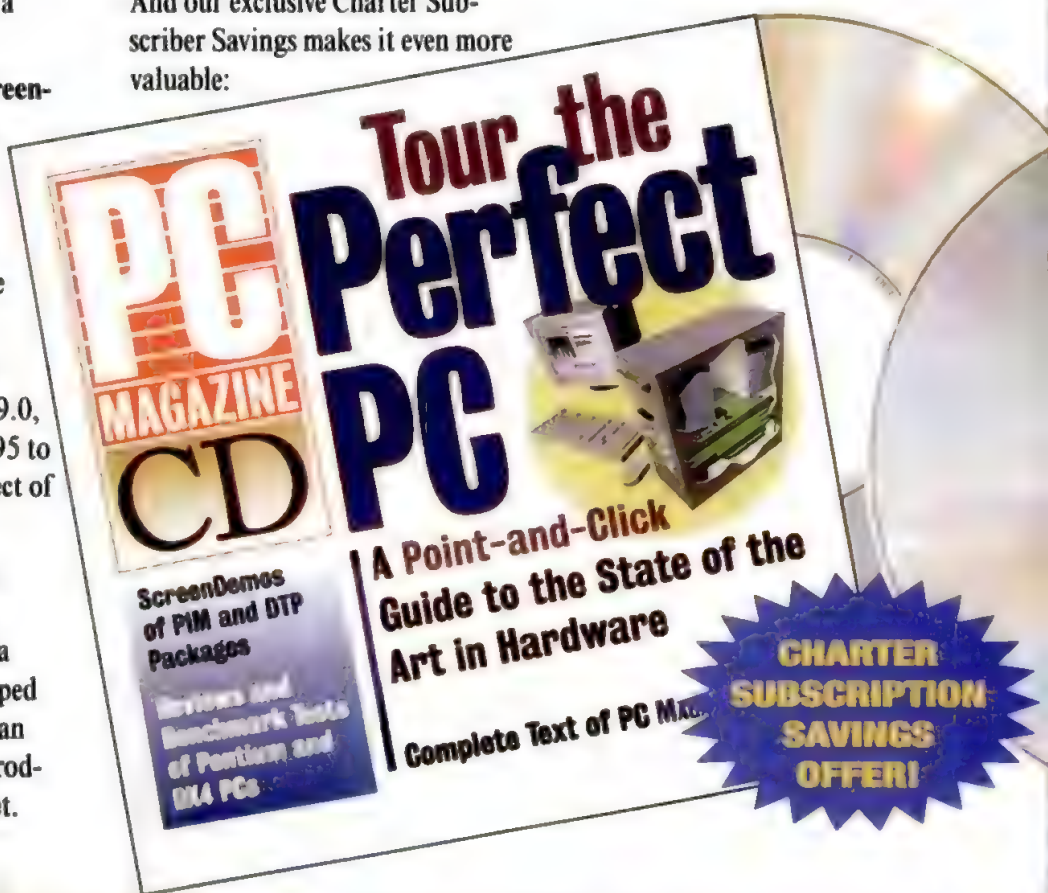
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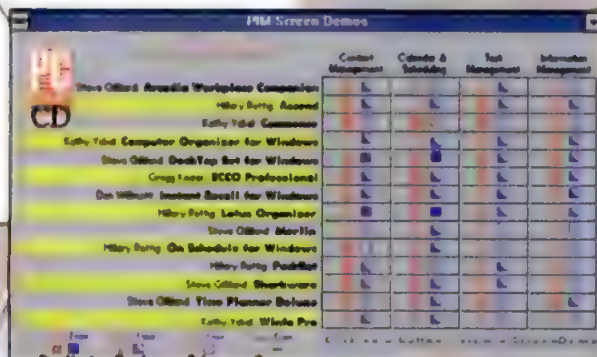
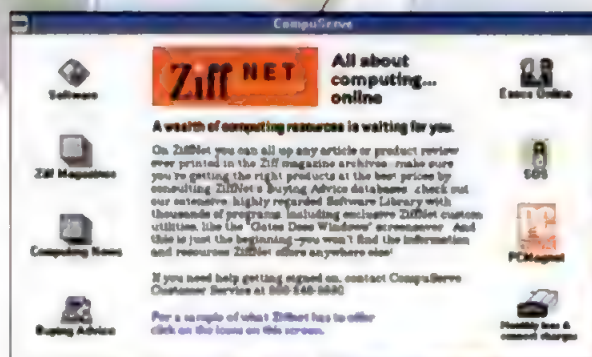
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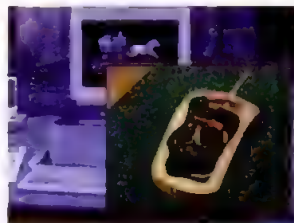
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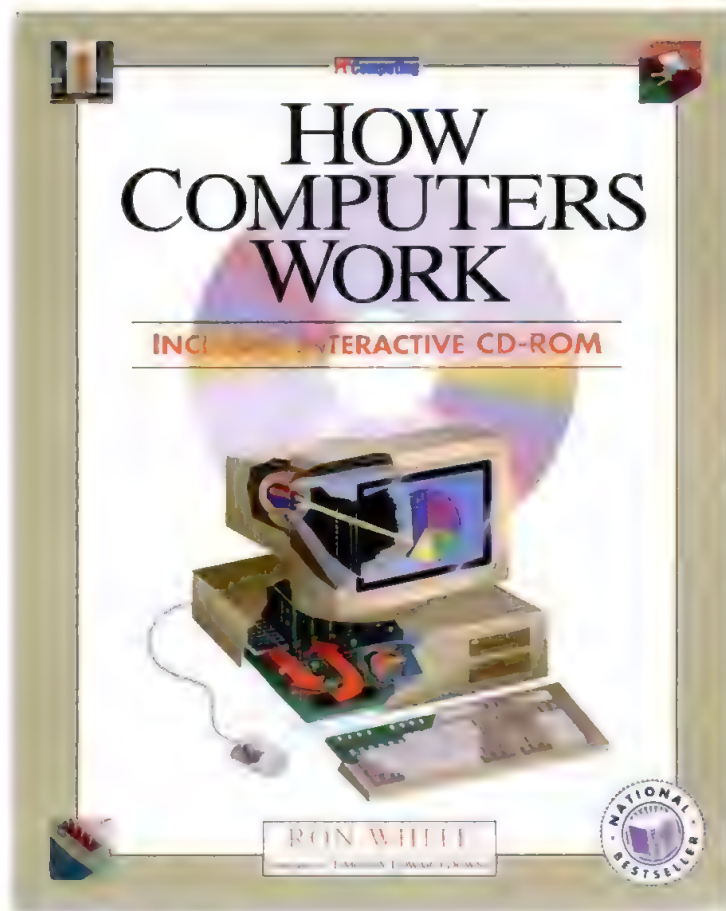


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Power Programming

BY RAY DUNCAN

Generating RTF Files for Windows Help

Looking back on the metamorphosis of Microsoft Windows from a curiosity into a juggernaut after the release of Version 3.0 in 1990, we can see that the most critical factor was the new ability of Windows 3.0 to run applications in protected mode. This feature (which Stephen Manes and Paul Andrews's book *Gates* tells us was arrived at almost by happenstance) relieved the memory constraints that had crippled earlier versions of Windows and its applications. It also opened the door to a much fuller exploitation of the advanced features of the Intel 386 and later CPUs and, incidentally, increased the stability of the system substantially by taking advantage of the hardware's ability to trap invalid memory references.

Windows 3.0 also included many other improvements and changes, of course (although some of them, such as the Windows Program Manager, have proven to be drawbacks rather than assets). But looking through the lens of my personal retrospectroscope, I can conclude that second to the transition to protected mode, the most revitalizing new feature of Windows 3.0 was its standard help file compiler and viewer. For the first time on any GUI platform, application developers were handed the tools to create attractive on-line hypertext manuals that could be shipped royalty-free with any Windows-based software product and that were guaranteed to be readable and printable on any Windows system.

The retrospectroscope also shows us that during the initial phase of the Windows boom, many developers remained clueless about the help file compiler and viewer for quite some time. It was common for early attempts at on-line help files to be crude, ugly, poorly organized, minimally hyperlinked, or so cluttered up with excessive use of different fonts and colors that they were essentially unreadable. This situation was perhaps inevitable when programmers were suddenly expected to double as technical writers and publishers, but it was aggravated by the absence of a reservoir of peer-group experience, the opaque nature of help file coding, weak documentation, and most important, a lack of reasonable authoring tools.

To build a Windows help file, a developer needs two types of files: a help project control (.HPJ) file, which controls the behavior of the help file compiler, and one or more files containing the source text for the help file, encoded in a grammar called Rich Text Format (RTF). The earliest days of WinHelp were marked by the use of "zeroth-generation" authoring tools (general-purpose tools that had no intrinsic knowledge of the help compiler's requirements). The .HPJ file had to be edited directly in an ASCII text editor.

The RTF files could be created either by exporting to RTF from a WinWord document or by editing RTF directly in an ASCII text editor.

WINHELP AUTHORIZING TOOLS WinHelp documentation during the early days was little better than the authoring tools. There was a terse summary of the valid .HPJ file directives in one of the Windows SDK manuals, and there was likewise a cryptic summary of the RTF file markup commands in another of the SDK manuals. A brief overview of help file construction was provided, but it was all written in terms of creating a Word for Windows document and then exporting it to RTF for compilation. The help file encoding was explained as a process of inserting page breaks, footnotes, hidden text, and other WinWord formatting constructs in a document, with virtually no information on how these formats were mapped to RTF during the export process or their effect on the help file compiler.

About the time of the birth of Windows 3.1, the first generation of true help file authoring tools appeared. Microsoft

A new wave of help authoring tools has eased the pain of creating Windows Help, but sometimes you'll want to handle the details yourself.

released a package of WinWord macros called WHAT (Windows Help Authoring Tools) that made encoding help file hyperlinks and keywords considerably easier; WHAT was officially unsupported but was made widely available on CompuServe and bulletin boards. Microsoft also released a thorough and extremely helpful treatise on help file implementation called the Windows Help Authoring Guide (WHAG); again, although WHAG was unofficial and unsupported, it was made widely available on CompuServe and other venues. WHAG was distributed in the form of a Windows help file and pioneered the use of WinHelp as a medium for electronic publishing in its own right.

Several software houses followed in the footsteps of WHAT and provided more elaborate packages of WinWord macros, hot spot editors, project file managers, and custom DLLs for sale to help

file implementers. Blue Sky Software Corp.'s RoboHelp, which is currently at Version 2.6, is typical of the various commercial first-generation help file authoring tool sets. Although many developers have successfully used these tools, I have never felt satisfied with them for several reasons. First, they require the separate purchase of Word for Windows, a cruel blow to developers who are accustomed to (and already own) another word processor. Second, they ride on the back of the programmability of WinWord, and therefore are not in full control of the authoring process. (For example, they can't prevent the author from inserting formats that are not recognized by the help compiler.) Third, while they may work acceptably for a help project that is started from scratch in the context of the tool, they are clumsy when applied to preexisting projects.

In recent months, we have seen the emergence of a second generation of Windows help authoring tools. Microsoft has released an unsupported but sophisticated help file analysis, documentation, and debugging tool called HULK, a cute if contrived acronym for Microsoft Help Universal Kit, Version 2.1. (Microsoft has also distributed updates to the older WHAT and WHAG packages for use with WinWord, Version 6). On the commercial side, vendors have begun to ship elaborate, self-con-

late help file operation without resorting to a full compile, detect coding errors on the fly, and represent the structure of the help file graphically for easy navigation among its components.

The public literature on the help compiler, help viewer, and help file structure has also made a jump to a new quantum level of competence. Several books on help file development have appeared, many articles have been published in the trade press, and the Internet newsgroup and mailing list dedicated to help file development are buzzing with activity. The proprietary internal structures of help files and their compression algorithms have been puzzled out and disseminated, allowing for the first time the creation of third-party utility programs to print out the entire contents of help files, reverse their compilation to a text file, or simply allow help files to be viewed in a non-Windows environment. Quite a change from the situation two years ago when I wrote my first *PC Magazine* columns on WinHelp!

WHAT IS RTF ANYWAY? A few paragraphs back, I mentioned that the help file compiler requires its input in Rich Text Format (RTF) and that WinWord knows how to export RTF on demand, but I brushed by the question of what RTF really is. At the time Windows 3.0 was released, Bill Gates had been mentioning RTF at various technical conferences for at least five years, but I suspect most developers (like myself) had simply shrugged it off ("Why in the world is Gates talking about *that* stuff? I'm a programmer, not a book designer!"), and the real information publishers had also shrugged it off for their own reasons ("Why in the world is Gates talking about *that* stuff? He's a programmer, not a book designer!"). The advent of the Windows Help Compiler certainly turned developers' heads around, at least, and rescued RTF from the oblivion it so richly deserved.

RTF is essentially a primitive example of a genre called *text markup languages*. It allows both the content and the appearance of a body of text to be represented as a stream of plain ASCII text, unlike a typical word processor document which consists of text interleaved with binary control information. The text stream is made up of special reserved commands and delimiters interspersed with the actual text. White space in the

file is essentially ignored; line, paragraph, and page breaks are controlled by RTF commands, as are fonts, colors, margins, tab stops, and every other characteristic of text appearance you can imagine. RTF commands always start with the "\" character, and chunks of text can be delimited for formatting purposes with the curly braces "{" and "}".

For example, consider this one-sentence paragraph:

The last word of this paragraph sentence is in **boldface**.

This would be represented in RTF as the following stream of text:

```
\pard\plain\f4\fs20 The last word of
this paragraph sentence is in {\f4\b
boldface}.\par
```

The reserved commands shown in this brief example have the following significance:

```
\pard Force default paragraph format
\plain Force plain character format
\f4 Select typeface #4
\fs20 Select type size as 10 points
\b Select boldface type
\par Force end of paragraph
```

The global structure of an RTF file is pretty simple: a file header followed by a file body, all enclosed in curly braces:

```
{header body}
```

The header consists of the RTF file identifier,

```
{\rtf1\ansi \deff0\deflang1024
{\fonttbl
{\f0\froman Times New Roman;}
{\f1\froman Symbol;}
{\f2\swiss Arial;}
{\f3\swiss Helvetica;}
{\f4\swiss Hel;}
}
{\colortbl;
\red0\green0\blue0;
\red0\green0\blue255;
\red0\green255\blue0;
\red255\green0\blue0;
\red255\green255\blue255;
}
```

Figure 1: A typical RTF file header containing the RTF file identifier, character set, and default font identifier, along with minimal font and color tables.

tained help file development environments such as ForeHelp from ForeFront. These tools recognize and process RTF files directly and do not rely on an external word processor. They can emu-

tifier "\rtf1" followed by several mandatory items: a character set selector, a default font selector, a font table that relates typeface names to integer identifiers, and a color table that similarly relates colors expressed as RGB triplets to integer identifiers (see Figure 1). There may also be a table of styles present after the color table, but the styles are optional. The body is merely a stream of commands and text terminated by the final curly brace. When text within the body is delimited by additional pairs of curly braces, any formatting commands declared within the braces are effective only within the braces; any formatting that is unspecified within the braces is inherited from the text that immediately preceded the opening curly brace.

The full Rich Text Format Specification defines a bewildering variety of formatting commands. Fortunately for us, the Windows Help Compiler and the multimedia compiler recognize only a

very small subset of these commands. The list of commands honored by the help file compiler and multimedia compiler can be found in the Windows SDK

.....
*In practice, the RTF
specification is whatever
WinWord does, much as
DDE was defined in days
of yore by the way Excel
behaved.*
.....

Programmer's Reference, Volume IV, and the Multimedia Viewer Technical Reference, respectively; additional details can be found in the Windows Help Authoring Guide or the Microsoft RTF Version 1.2 Specification, both of which

can be found on the Microsoft Developer Network CD-ROM, among other places.

"Very well," you are probably thinking to yourself, "RTF is not so bad; it is what it is. The parts we have to worry about are relatively easy to understand, so why the harsh words?" There are several significant problems with RTF:

- The RTF specification was unilaterally created and promulgated by Microsoft and has never been subjected to an open process of technical review and refinement by industry experts on markup languages. As Microsoft has hung various new commands onto the markup language to support features of its own products (such as OLE), the specification has become increasingly awkward.
- In practice, the RTF specification is whatever WinWord does, much as DDE was defined in days of yore by the way Excel behaved. Each time a new version of Word for Windows has been released, the help compiler has been broken by the

RECORD

FIELD NO
100820

FIELD TI

*100820 ACHOO SYNDROME [AUTOSOMAL DOMINANT COMPELLING HELIOOPHTHALMIC OUTBURST SYNDROME; PHOTIC SNEEZE REFLEX; SNEEZING FROM LIGHT EXPOSURE; PEROUTKA SNEEZE]

FIELD TX

Collie et al. (1978) described a 'disorder' characterized by nearly uncontrollable paroxysms of sneezing provoked in a reflex fashion by the sudden exposure of a dark-adapted subject to intensely bright light, usually sunlight. The number of successive sneezes was usually 2 or 3, but could be as many as 43. The 4 authors were the probands of the 4 families they reported. Several instances of male-to-male transmission were noted. Sneezing in response to bright light was said by Peroutka and Peroutka (1984) to be a common yet poorly understood phenomenon. Photic sneeze reflex was suggested as the appropriate designation by Everett (1964), who found it in 23% of Johns Hopkins medical students. In a poll of 25 neurologists at Johns Hopkins, the Peroutkas (1984) found the phenomenon in 9, but only 2 of the respondents knew that such a specific reflex exists. The Peroutkas (father and daughter) reported the reflex in 3 generations of their family: grandfather, the father (the proband), his brother and his daughter. The index subject (S.J.P.) invariably sneezes twice when he moves from indoors into bright sunlight. Lewkonis (1969) described sneezing as a complication of slit lamp examination. Katz et al. (1990) found light-induced sneezing in 5 of 19 patients with nephropathic cystinosis (219880). This was presumably related to the crystal deposition in the cornea. Lerner (1991) took Hunter (1990) to task for referring to the photic sneeze reflex as a 'comic syndrome.' He cited reports by Beckman and Nordenson (1983), Forrester (1985), Morris (1987), and Lang and Howland (1987), in addition to those already cited here. Benbow (1991) reported that he had suffered from photic sneezing for over 20 years and having just learned of its existence found that the 'symptoms are more easily tolerated if you can put a name to them, even if that produces only an illusory understanding of their significance.' He commented on the potential hazards of photic sneezing if it occurs while one is driving a car on a sunny day. He said that he found that 'sudden exposure to sunlight when emerging from a road tunnel of sufficient length is sure to induce a sneeze.' Furthermore, 'driving through sunlit gaps in otherwise dense forest or past blocks of buildings can bring on a sneeze.'

FIELD RP

Beckman, L. and Nordenson, I.: Individual differences with respect to the sneezing reflex: an inherited physiological trait in man? Hum. Hered. 33: 390-391, 1983.

Benbow, E. W.: Practical hazards of photic sneezing. (Letter) Brit. J. Ophthalm. 75: 447 only, 1991.

Collie, W. R.; Pagon, R. A.; Hall, J. G. and Shokeir, M. H. K.: ACHOO syndrome (helio-ophthalmic outburst syndrome). Birth Defects Orig. Art. Ser. XIV(6B): 361-363, 1978.

Everett, H. C.: Sneezing in response to light. Neurology 14: 483-490, 1964.

Forrester, J. M.: Sneezing on exposure to bright light as an inherited response. Hum. Hered. 35: 113-114, 1985.

Hunter, K. M.: An M of one: syndrome letters in the New England Journal of Medicine. Perspect. Biol. Med. 33: 237-251, 1990.

Katz, B.; Melles, R. B.; Swenson, M. R. and Schneider, J. A.: Photic sneeze reflex in nephropathic cystinosis. Brit. J. Ophthalm. 74: 786-788, 1990.

Lang, D. M. and Howland, W. C., III: Solar sneeze reflex. (Letter) J.A.M.A. 257: 1330-1331, 1987.

Lerner, D. L.: Letter to the editor. Perspect. Biol. Med. 34: 469-470, 1991.

Lewkonis, I.: An infrequent response to slit lamp examination. Brit. J. Ophthalm. 53: 493-495, 1969.

Morris, H. H., III: ACHOO syndrome: prevalence and inheritance. Cleveland Clin. J. Med. 54: 431-433, 1987.

Peroutka, S. J. and Peroutka, L. A.: Autosomal dominant transmission of the 'photic sneeze reflex.' (Letter) New Eng. J. Med. 310: 599-600, 1984.

FIELD CS

ACHOO SYNDROME
AUTOSOMAL DOMINANT COMPELLING HELIOOPHTHALMIC
OUTBURST SYNDROME

Neuro: Paroxysmal sneezing; light-induced sneezing.
Gene: Autosomal dominant.

FIELD CX

AUTOSOMAL DOMINANT COMPELLING HELIOOPHTHALMIC OUTBURST SYNDROME;
PHOTIC SNEEZING;

FIELD ED

9/18/91

FIELD OLDNO

100820

Figure 2: A small MIM entry as it is listed in the original MIM source text file.

```

\page
$(\footnote {\fsl6\up6 $} 100820 ACHOO SYNDROME)
#(\footnote {\fsl6\up6 #} omim_100820)
+{(\footnote {\fsl6\up6 +} omim:00025)
!{(\footnote {\fsl6\up6 !}
CloseWindow('picwin');DisableButton('btn_picture')}}
K(\footnote {\fsl6\up6 K} ACHOO SYNDROME)
K(\footnote {\fsl6\up6 K} AUTOSOMAL DOMINANT COMPELLING HELIOOPHTHALMIC
OUTBURST SYNDROME)
K(\footnote {\fsl6\up6 K} PHOTIC SNEEZING)
\keepn \f2\fs28 100820 ACHOO SYNDROME
\par \pard \f2\fs20 (\dtype)
(\b Clinical Synopsis:)
\keep \par \par
ACHOO SYNDROME
\par
AUTOSOMAL DOMINANT COMPELLING HELIOOPHTHALMIC
\par
OUTBURST SYNDROME
\par
Neuro: Paroxysmal sneezing: light-induced sneezing.
\par
Gene: Autosomal dominant.
\par \pard
(\b Commentary:)
\par
\par
Collie et al. (1978) described a 'disorder' characterized by nearly
uncontrollable paroxysms of sneezing provoked in a reflex fashion by
the sudden exposure of a dark-adapted subject to intensely bright
light, usually sunlight. The number of successive sneezes was
usually 2 or 3, but could be as many as 43. The 4 authors were the
probands of the 4 families they reported. Several instances of
male-to-male transmission were noted. Sneezing in response to bright
light was said by Peroutka and Peroutka (1984) to be a common yet
poorly understood phenomenon. Photic sneeze reflex was suggested as
the appropriate designation by Everett (1964), who found it in 238 of
Johns Hopkins medical students. In a poll of 25 neurologists at
Johns Hopkins, the Peroutkas (1984) found the phenomenon in 9, but
only 2 of the respondents knew that such a specific reflex exists.
The Peroutkas (father and daughter) reported the reflex in 3
generations of their family: grandfather, the father (the proband),
his brother and his daughter. The index subject (S.J.P.) invariably
sneezes twice when he moves from indoors into bright sunlight.
Lewkonja (1969) described sneezing as a complication of slit lamp
examination. Katz et al. (1990) found light-induced sneezing in 5 of
19 patients with nephropathic cystinosis (219800). This was
presumably related to the crystal deposition in the cornea. Lerner
(1991) took Hunter (1990) to task for referring to the photic sneeze
reflex as a 'comic syndrome.' He cited reports by Beckman and
Nordenson (1983), Forrester (1985), Morris (1987), and Lang and
Howland (1987), in addition to those already cited here. Benbow
(1991) reported that he had suffered from photic sneezing for over 20
years and having just learned of its existence found that the
'symptoms are more easily tolerated if you can put a name to them,
even if that produces only an illusory understanding of their
significance.' He commented on the potential hazards of photic
sneezing if it occurs while one is driving a car on a sunny day. He
said that he found that 'sudden exposure to sunlight when emerging
from a road tunnel of sufficient length is sure to induce a sneeze.'
Furthermore, 'driving through sunlit gaps in otherwise dense forest
or past blocks of buildings can bring on a sneeze.'
\par
\par

```

```

Note: Inheritance proven (in Dr. McKusick's judgement).
\par
\par
(\b Last change:) 9/18/91
\par
\par
(\b Old OMIM number:) 10082
\par
\par
(\b References:)
\par
\par
Beckman, L. and Nordenson, I.: Individual differences with respect to
the sneezing reflex: an inherited physiological trait in man? Hum.
Hered. 33: 398-391, 1983.
\par
\par
Benbow, E. W.: Practical hazards of photic sneezing. (Letter) Brit.
J. Ophthalmol. 75: 447 only, 1991.
\par
\par
Collie, W. R.; Pagon, R. A.; Hall, J. G. and Shokeir, M. H. R.: ACHOO
syndrome (helio-ophthalmic outburst syndrome). Birth Defects Orig.
Art. Ser. XIV(6B): 361-363, 1978.
\par
\par
Everett, N. C.: Sneezing in response to light. Neurology 14: 483-490,
1964.
\par
\par
Forrester, J. M.: Sneezing on exposure to bright light as an
inherited response. Hum. Hered. 35: 113-114, 1985.
\par
\par
Hunter, K. M.: An N of one: syndrome letters in the New England
Journal of Medicine. Perspect. Biol. Med. 33: 237-251, 1990.
\par
\par
Katz, B.; Melles, R. B.; Swenson, M. R. and Schneider, J. A.: Photic
sneeze reflex in nephropathic cystinosis. Brit. J. Ophthalmol. 74: 786-
788, 1990.
\par
\par
Lang, D. M. and Howland, W. C., III: Solar sneeze reflex. (Letter)
J.A.M.A. 257: 1330-1331, 1987.
\par
\par
Lerner, D. L.: Letter to the editor. Perspect. Biol. Med. 34: 469-
470, 1991.
\par
\par
Lewkonja, I.: An infrequent response to slit lamp examination. Brit.
J. Ophthalmol. 53: 493-495, 1969.
\par
\par
Morris, M. H., III: ACHOO syndrome: prevalence and inheritance.
Cleveland Clin. J. Med. 54: 431-433, 1987.
\par
\par
Peroutka, S. J. and Peroutka, L. A.: Autosomal dominant transmission
of the 'photic sneeze reflex.' (Letter) New Eng. J. Med. 310: 599-
600, 1984.
\par
\par
\par
\page

```

Figure 3: The same MIM entry as in Figure 2, after its translation to RTF.

changes in WinWord's RTF output and has had to be made available to developers on CompuServe in a new version specifically for compatibility with WinWord.

- RTF is adequate for character and paragraph formatting but—unlike the industry Standard Generalized Markup Language (SGML)—does not address higher levels of structure and organization in a document. In other words, RTF is oblivious to document content, and it cannot describe hierarchies of information within a document or interdependencies between different types of objects in a document.

But enough carping for one day. Let's

turn our attention to something a bit more practical.

WRITING RTF GENERATORS As the capabilities of Windows help authoring tools have evolved, most developers have been able to move further and further away from worrying about the nitty-gritty details of RTF commands. But there are circumstances where it makes sense to tackle RTF head-on, where in fact the direct generation of RTF can be an exceedingly potent weapon for the subjugation of huge text databases. Let me return to a case history of my own, which I alluded to briefly in my last Power Programming column "Electronic Publishing With Windows Help" that

appeared in our January 10, 1995 issue.

For the last year and a half, I've been working on an electronic publishing project that involves integration of several genetic databases on a CD-ROM with a query and reporting interface that runs under Microsoft Windows. One of the databases is actually the text of a very large reference book, *Mendelian Inheritance in Man* (MIM), written by Dr. Victor A. McKusick and published by The Johns Hopkins University Press. For many years, the text of the book has been edited and maintained on a computer. The source text is rendered at differing intervals into both an on-line database that can be searched over the Internet and into

Power Programming



Figure 4: This is the same MIM entry after compilation with the help compiler, as viewed under Windows.

a traditional printed book (currently in its 11th edition).

Somewhat like an encyclopedia, the book version of MIM has about 6,000 topics. Each topic describes a particular inheritable disease or other human characteristic and is identified by a unique number (the "MIM Number") that, once assigned, stays stable forever, even if the contents of a particular topic are altered drastically over time. Each topic is further subdivided into sections, and there are about a dozen possible sections in all ("clinical synopsis," "references," "last edit date," etc.), although all of the section types may not be present in any particular entry. The length of the individual MIM topics can vary wildly, as can the length of the sections within an entry. The shortest topics are only a few dozen words, while the longest topics run to tens of thousands of words.

The consolidated text file version of MIM, which can be obtained from an FTP server at Johns Hopkins University, is formidable—it was about 25 megabytes when I first started working with it and has since grown to around 30 megabytes. Looking at an individual topic within the file, we find that the start of a topic is indicated by the magical token **"*RECORD*"**, and the beginning of each section within a topic is designated by the token **"*FIELD*"**, followed by a two-character string that indicates the section type. Some sections contain free text, while others contain sequences of keywords or other highly constrained information. An example of one of the shorter and more whimsical

MIM topics, describing the "Achoo Syndrome," is shown in Figure 2.

The MIM text file in its virgin form is, naturally, extremely difficult to get much benefit out of on a personal computer. The word processors we all know and love get nervous and prone to freeze-ups and GP faults when they are asked to handle a file of that size, and locating any particular topic by a standard sequential search is so slow that it's a powerful deterrent to using the file at all. However, if by some magic the

MIM text file could be transformed into a Windows help file or multimedia viewer file with a table of contents, hot links, keywords, and browse sequences, access to any particular topic within the file would be fast and easy. Conversion to a help file would also allow us to take advantage of the help compiler's compression feature.

You can already begin to see how a simple program to perform translation of the MIM text file into an RTF file could be thrown together. Each topic could be labeled with a context string that was a function of its unique MIM number. A table of contents could be built up by accumulating a list of MIM numbers and topic titles as the file was processed. You'd need some simple routines to generate the RTF file header and trailer with a minimal font table and color table. You'd need some general purpose routines to build topic dividers with their titles in a non-scrollable window, control font selection, synthesize hot links, and generate RTF footnotes for encoding of keywords, context strings, browse sequences, and titles for the history window.

Once the idea of conversion of MIM to a Windows help file occurred to me, it only took me about a day of experimentation to come up with a preliminary translator program. I wrote the first version in MS-DOS 5.0's QBasic, and was pleasantly surprised to find that it

processed the 25MB text file in about 20 minutes, and even more pleasantly surprised when the help file compiler proved itself able to handle the resulting 26MB RTF file without crashing. The sample MIM topic from Figure 2 is shown in its RTF form in Figure 3, and in its compiled viewable form in Figure 4. The bad news was that the help compiler required about 5 hours to do its thing on this file, which meant that the compilations usually had to be left running at night and that only one major change could be made to the implementation.

Because of the unpredictability of the size of MIM entries and the large size of a very few entries, I found it impossible to use string arrays as intermediate storage in the QBasic version of the translator program. Consequently, the original program wrote each section of a topic to a separate temporary file, waiting until the end of the topic was encountered to read the temporary files back in and process them (since only at the end of a topic could the translator program be sure which sections were present). While I was writing this column, I realized that if I recoded in the program in Access Basic, I could use Access tables for intermediate storage and bring the full force of the database engine's search, sort, and selection capabilities to bear on the text of each MIM topic. Porting to Access Basic also improved the readability, main-

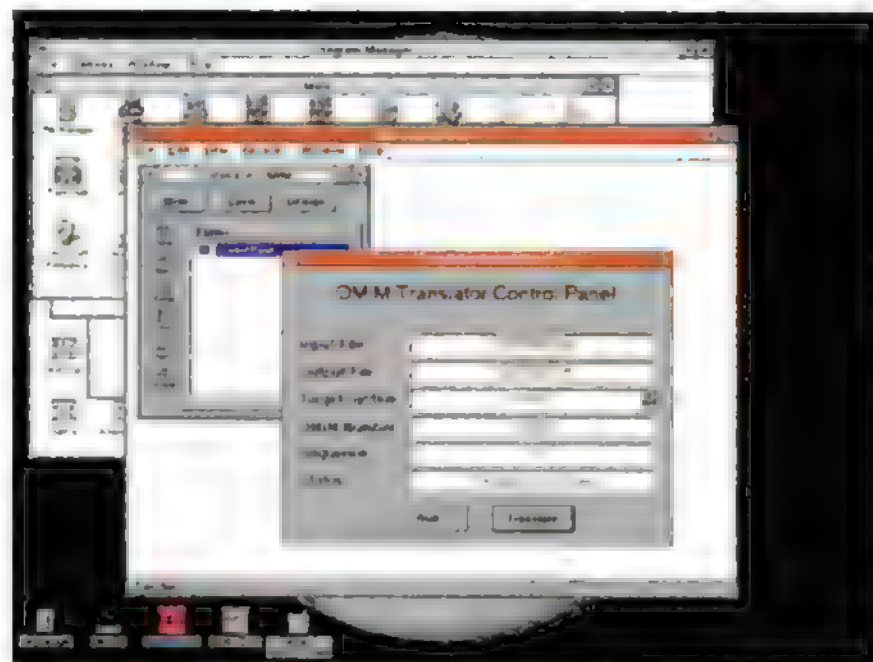


Figure 5: This is the control panel for the RTF translator program for MIM.

tainability, and usability of the program in many other ways and even prompted me to construct a pretty status and control panel (see Figure 5)!

I've omitted several aspects of the MIM translator program from this dis-


```
Sub EmitRTFFileHeader (FileNum As Integer)

' Generate RTF file header using passed file number
' Assumes that the file has been previously opened
' successfully

' Emit RTF file identifier, character set, etc.
Print #FileNum, "{\rtf1\ansi \deff0\deflang1024"

' Generate a minimal font table containing just enough
' fonts to support Windows and Macintosh viewing
Print #FileNum, "{\fonttbl"
Print #FileNum, "{\f0\froman Times New Roman;}"
Print #FileNum, "{\f1\froman Symbol;}"
Print #FileNum, "{\f2\fswiss Arial;}"
Print #FileNum, "{\f3\fswiss Helvetica;}"
Print #FileNum, "{\f4\fswiss Hel;}"
Print #FileNum, "}"

' Generate a minimal color table consisting of black,
' blue, green, red, and white.
Print #FileNum, "{\colortbl;"
Print #FileNum, "\red0\green0\blue0;"
Print #FileNum, "\red0\green0\blue255;"
Print #FileNum, "\red0\green255\blue0;"
Print #FileNum, "\red255\green0\blue0;"
Print #FileNum, "\red255\green255\blue255;"
Print #FileNum, "}"

' Set the default font to Times New Roman
Print #FileNum, "\deff0"

' Generate an initial topic separator
Print #FileNum, "\page"

End Sub

Sub EmitRTFFootnote (FileNum As Integer, FootnoteChar As
String, FootnoteBody As String)

' Routine to emit RTF footnote record.
' Assumes output file has been previously opened
' as #FileNum.
' Superscripting of FootnoteChar is not really necessary
' but looks nicer if RTF file is read into WinWord
' later.

Print #FileNum, FootnoteChar + "{\footnote ";
Print #FileNum, "{\fs16\up6 " + FootnoteChar + "} ";
Print #FileNum, FootnoteBody + "}"

End Sub

Sub EmitRTFTabStop (FileNum As Integer, TabStop As
Integer)

' The RTF \tx command parameter and thus the TabStop
' parameter for
' this subroutine is given in twips. 1440 twips = one
' inch.

Dim Str1 As String
```

```
Str1 = "\tx" & LTrim$(Str$(TabStop)) & " "
Print #FileNum, Str1

End Sub

Sub EmitRTFTopicDivider (FileNum As Integer, TopicHeading
As String, ContextString As String, TitleFootnote As
String, BrowseSequence As String)

' This routine emits the RTF code to begin a
' new "topic".
' The code consists of a "page break" command followed
' by footnotes for the topic's context string, title
' footnote for history list, and browse sequence,
' followed by the topic heading which appears in
' a nonscrolling region in 14 pt. type. Default
' paragraph formatting and font are then restored.

' signal start of new viewer topic
Print #FileNum, "\page"

' write context string footnote as label for this topic
Call EmitRTFFootnote(FileNum, "#", ContextString)

' write title footnote to be used in history
' window and (for multimedia viewer) in search dialogs
Call EmitRTFFootnote(FileNum, "$", TitleFootnote)

' write browse sequence number footnote
Call EmitRTFFootnote(FileNum, "+", BrowseSequence)

' Write the topic header text, using the keep with next
' attribute to put the header in a nonscrolling window
Print #FileNum, "\keepn \f2\fs28 ";
Print #FileNum, TopicHeading
Print #FileNum, "\par "

' Restore default paragraph formatting and font
Print #FileNum, "\pard \f2\fs20 {\dtype}"

End Sub

Sub EmitRTFTrailer (FileNum As Integer)

' Routine to generate RTF file trailer.
' Just emits RTF codes to close out the current
' paragraph if any and then close out the current
' topic, following all with a closing brace to
' balance the initial brace written by the
' EmitRTFHeader routine.

Print #FileNum, "\par"
Print #FileNum, "\page"
Print #FileNum, "}"

End Sub
```

Figure 6: Some useful Access Basic routines to generate RTF file headers, trailers, footnotes, topic dividers, and so on.

cussion, such as the strategies I evolved to integrate pictures and video clips into the file automatically, but I hope my little case history has given you a taste of the power that RTF translation and the help compiler and viewer can give you over otherwise unmanageable bodies of text. It is even more amazing what you can do with large relational databases if you "flatten" them out into all the possible views, run the flat files through an RTF

translator, and present the database views to the user with the aid of the help compiler and viewer. The performance of the database is improved by orders of magnitude from the user's perspective, since the database joins are in effect "hardwired" in advance. I'll show you an example of that technique in a future column. In the meantime, I've included a few Access Basic routines for RTF generation in Figure 6 that you can use as a starting point

for your own programs.

You can download all of the code mentioned in this column from PC MagNet's Programming forum archived as RTF.ZIP.

THE IN BOX Please send your comments and suggestions to me at any of the following e-mail addresses:

PC MagNet: 72241,52

MCI Mail: RDUNCAN

Internet: DUNCAN@CERF.NET □



Utilities

BY NEIL J. RUBENKING

A Calculator with "Paper Tape"

Want to see a live dinosaur? Just launch the Windows Calculator accessory (CALC.EXE) and take a good long look. CALC is a refugee from the early days of Microsoft Windows, and it's decidedly not up to the standards of Microsoft Windows for Workgroups, Version 3.1, applications. Its buttons aren't true buttons; they're just painted on. The keyboard equivalents for those buttons are neither memorable nor consistent. And worst of all, CALC doesn't provide any way for you to check your work after entering a series of figures.

TapeCalc, this issue's utility, is a Windows calculator for the modern world. Its on-screen keys are real Windows-type buttons that also provide visual feedback by depressing visibly when you press the corresponding keyboard key. TapeCalc maps most math operations to function keys rather than emulating the jumble of alphabetic keys, punctuation, and control keys used by CALC. And TapeCalc keeps a record of your calculations on a simulated paper tape, so if the answer doesn't look right, you can go back and double-check the numbers you entered.

TapeCalc is designed for real-world tasks like balancing a checkbook. Set it to display results in fixed-point mode with two decimals and then start adding deposits and subtracting withdrawals. Double-check your results by comparing the numbers on the tape with the numbers in your checkbook.

But if you want to perform complex tasks, such as XOR operations on hexadecimal numbers or taking the hyperbol-

ic sine of pi, stick with CALC's Scientific mode. TapeCalc does not support these functions.

You can download your own copy of TapeCalc and its help file as TAPECA.ZIP from PC MagNet's Utilities/Tips Forum, Library 2 (PC Mag Utilities). Download TAPECS.ZIP for the complete source code. TapeCalc is a Visual Basic program and requires the Visual Basic support library VBRUN300.DLL. If that file is not already on your system, download VBRUN3.ZIP from Library 15 of the Utilities/Tips Forum. TapeCalc also relies on the Visual Basic custom controls CMDIALOG.VBX, KEYSTAT.VBX, THREED.VBX, and GRID.VBX, which are found in TAPEC2.ZIP.

USING TAPECALC To install TapeCalc, decompress TAPECA.ZIP into the directory of your choice, and, if necessary, decompress VBRUN3.ZIP into your Windows system directory (usually C:\WIN-

DOWS\SYSTEM). Installing the custom controls requires a bit more care. Create a temporary directory under your Windows system directory, and decompress TAPEC2.ZIP into it. Now for each of the four .VBX files, check to see whether a newer version already exists in the Windows system directory. Copy the .VBX into the Windows system directory only if it doesn't already exist there, or if the copy already present is older.

Once the files are in place, activate Program Manager. Open the group you want to put TapeCalc into, select New from the File menu, enter "TapeCalc" in the Description field of the properties dialog, and enter the full pathname for TAPECALC.EXE in the Command Line field. Press OK and you're ready to calculate.

If you know how to use a pocket calculator, you already know how to use TapeCalc. Figure 1 shows the TapeCalc's "keypad." You enter numbers by clicking on the number buttons or pressing the number keys on the keyboard. If you type the wrong digit, press the Backspace button (←) or the Backspace key on the keyboard to erase it. Enter an operator: Plus (+), Minus (-), Times (*), Divide (/), or Power (^); enter another number, and press the Equal sign (=) to get the answer. Simple!

Each element of your calculation becomes a line on the tape. By default, the tape holds 255 lines, but you can set its length anywhere from 40 to 1,000 lines. When the tape fills up, the oldest lines scroll off the top and disappear.

It's not uncommon to choose the wrong operator when you're using a calculator. For example, if you're subtracting checks from your bank balance, you may well press the minus sign before realizing that the next item is a deposit. TapeCalc lets you change your mind. When you press an operator, the corresponding button lights up to show that the operation is pending. If you press another operator before entering any numbers, TapeCalc accepts it and even changes the tape. So, for example, the button sequence

2 * / - ^ + 3 =

yields 5. It's also easy to hit an extra + (or other operator) after the last item in a long column of figures. That's no prob-

Top 10 Utilities

Rank	Utility
1	FINDIR - Locates available IRQs
2	WINCMD - Command file interpreter
3	MYGRPS - Customizes group icons
4	ALLPAP - Sizes wallpaper images
5	WTIME - Keeps PC clock accurate
6	WPNTN - Highlights Windows presentations
7	QUICKO - Copies disks quickly
8	INCTRL - Controls Windows installation
9	MONITOR - Monitors system resources
10	WCLIB - Function library for WINCMD

This list is based on the total number of downloads each utility has had on PC MagNet over the past month. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them."

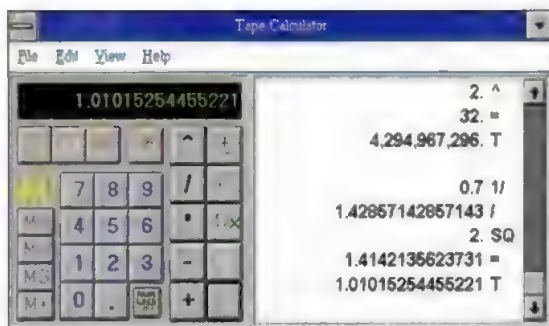


Figure 1: TapeCalc is an updated and streamlined replacement for the antiquated Windows Calculator accessory.

lem: Just press = and TapeCalc will ignore the extra operator. (Note that in CALC, if you press an operator and immediately press =, the indicated operation is performed using the displayed number on both sides of the operator. Thus, "2 * =" is the same as "2 * 2 =", and "2 / =" is the same as "2 / 2 =". TapeCalc rejects this confusing behavior.)

The five operators mentioned above are called *binary* operators, because they act on two numbers. There are also two *unary* operator buttons: Square Root and Reciprocal. The symbol on the Square Root button is the standard square root sign ($\sqrt{}$), and the symbol on the Reciprocal button is 1/X. When you press one of these buttons, it acts directly on the number in the display window, without changing the ongoing calculation. So, for example,

$$5 + 4 \sqrt{} =$$

yields 7, which is 5 plus the square root of 4. And

$$5 + 4 \ 1/X =$$

yields 5.25, which is 5 plus the reciprocal of 4. After you press one of these, the new number in the display window is frozen: You can't edit it.

The Reverse Sign button ($\pm$) might seem to be another unary operator, but it's not quite the same as the other two. Pressing this button simply reverses the sign of the number in the display window, but after pressing it, you can continue entering digits. TapeCalc maps the three buttons $\pm$, $\sqrt{}$, and 1/X to F2, F3, and F4, respectively. (F1 is reserved for Help.) Note that for the same three buttons, the

keyboard equivalents in Windows CALC are F9, @, and lowercase r!

The power operator (^) may not be entirely familiar, as it's not present on most pocket calculators. If the base B (the number being raised to a power) is a positive number and the exponent E (the power to which you're raising the number) has no fractional part, power calculations work like this:

- B^E Multiply B by itself E times
- B^1/E Multiply B by itself E times, then take the reciprocal of the result
- B^1/E Calculate the Eth root of B, that is, the number which when multiplied by itself E times equals B

To find 2 to the 10th power, for example, you'd enter

$$2 \wedge 10 =$$

To find the cube root of 8, you'd use

$$8 \wedge 3 \ 1/X =$$

If the base is less than 0, the exponent must be a number with no fractional part, or the calculation will cause an overflow.

An overflow occurs when you attempt an impossible calculation like dividing by 0 or taking the square root of -1. It can also be caused by a calculation whose result is simply too large for the calculator to handle, like 2 to the 1,024th power. When overflow occurs, TapeCalc displays "Overflow" in its display window and refuses to respond to any other input until you press the Clear (C) or Clear Entry (CE) button. (The keyboard equivalents for Clear and Clear Entry are Esc and Del.) You can press C any time to completely clear the calculator or CE just to clear the display window.

The Percent button (%) is normally used to add or sub-

tract a certain percent from a number. For example,

$$59.95 + 40 \%$$

will return 59.95 plus 40 percent of 59.95. The result is 83.93. Entering

$$8 - 25 \%$$

will return 6, which is 8 minus 25 percent of 8. It doesn't make sense to use % in the same way with the *, /, or ^ operator, so TapeCalc just doesn't let you do this: It beeps and ignores the button. But when you're entering the first number of a calculation, you can use % to quickly divide the number by 100. For example,

$$50 \% * 36$$

is 18.

Like most pocket calculators, TapeCalc has a memory. Press the Memory Store button (MS) to store the contents of the display window in memory, replacing anything that may have been there before. Press Memory Plus (M+) to add the contents of the display window to memory. (To subtract, press $\pm$ and then M+). Putting something into memory with MS or M+ will light up a yellow M above the column of memory buttons. Press Memory Clear (MC) to clear memory and to turn off that yellow M. And press Memory Recall (MR) to copy the memory's contents into the display window. For example, to calculate $(2*3) + (4*5) + (6*7)$:

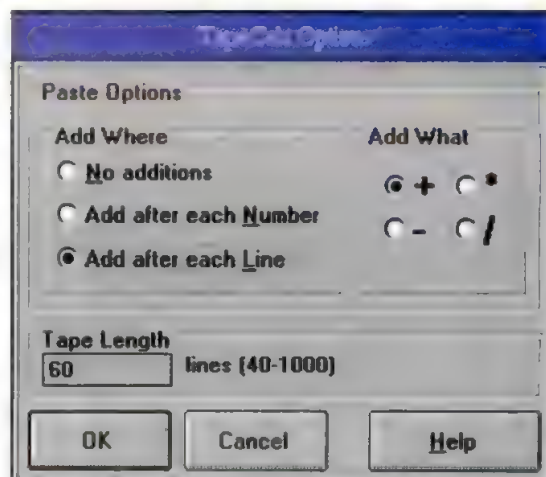


Figure 2: The Paste Options dialog box lets you control what happens when text is pasted into TapeCalc.

Press 2 * 3 =, then MS
Press 4 * 5 =, then M+
Press 6 * 7 =, then M+
Press MR

The MS and M+ buttons in TapeCalc work just a bit differently from the corresponding buttons in CALC. Once you press MS or M+ in CALC, the number you're entering is frozen; typing another digit or ← (backspace) will wipe it out and start a new calculation. In TapeCalc, MS and M+ do not affect the number you're entering. You can, for example, use ← to correct an error even after pressing MS.

Two buttons remain to be explained, both of which have no equivalent in CALC. If you want to use the numeric keypad on your keyboard to enter numbers, you can press the NumLock key on the keyboard. The NumLock button on the calculator, next to the decimal point (.), lets you turn NumLock on or off with a click of the mouse. The button with an Up Arrow on it (next to ←) is the equivalent of the Tape Advance button on a desk calculator. Clicking it (or pressing F9) adds a blank line at the end of the tape.

TAPECALC'S MENU CHOICES All of the calculating and figuring you do using TapeCalc is handled by clicking buttons or pressing keys. Less common tasks are relegated to the menu system.

Select "New tape" from the File menu to blank the tape completely and start fresh. The key combination Ctrl-N has the same effect. If you want to save the tape to a file before clearing it, select "Save tape" from the File menu. If you've already saved to a particular filename, this option will overwrite the same file. Select "Save tape as. . ." to choose a new filename.

You can choose to save only a portion of the tape by highlighting two or more lines: Just drag the mouse over the lines you want to highlight. To highlight part of the tape with the keyboard, press Tab if necessary to make the tape active. With arrow keys, move the dotted selection rectangle to the beginning of the area you want to save and then hold Shift while moving to the end of the desired area.

With either method, the first line selected will show the selection rectangle and will not be displayed as highlighted. You'll notice that the tape is actually com-

posed of two columns, a wide one with numbers on the left and a narrow one with symbols on the right. It's not necessary to highlight both columns.

The Edit menu includes Copy, Paste, and Copy Result. Choosing Copy or pressing Ctrl-C copies the tape to the clipboard. As when saving to a file, if two or more lines are highlighted, only the highlighted portion is copied. Choosing Copy Result (Ctrl-R) copies the contents of the display window to the clipboard.

Select Paste or press Ctrl-V to paste the contents of the clipboard into TapeCalc. The only characters TapeCalc accepts are digits, operators, and ".", "%", and "=". What it does with rejected characters depends on options you set in the Paste Options dialog box (see Figure 2), accessed by choosing "Paste Options . . ." from the Edit menu.

If "No additions" is selected, other characters are completely ignored. Pasting the string "2 apples 2 + 3 oranges 3 = fruit salad" will simply calculate 22 + 33.

If "Add after each Number" is selected, then all rejected characters except the comma are replaced by the operator specified in the Add What group of option buttons. For example, if + is selected and you paste "2 3 4" into TapeCalc, it will calculate the sum of 2, 3, and 4. Only the four basic operators +, -, *, and / are available for automatic insertion.

If "Add after each Line" is selected, all rejected characters are ignored except for the carriage-return character, which is replaced by the selected operator. "Add after each Line" can be useful when adding up a column of figures copied from a word processing document, for example.

"Tape length" isn't precisely a Paste Option, but TapeCalc includes it in this dialog box rather than giving it a dialog all to itself. If you enter a value less than 40, TapeCalc will adjust it up to 40; if your entry is over 1,000, TapeCalc will adjust it down to 1,000. All of these options are stored in TapeCalc's .INI file for reuse next time you start TapeCalc.

Place or remove the check mark next to the Tape Visible item on the View menu to show or hide the tape. TapeCalc maintains the tape even when it's hidden. If the numbers on the tape are difficult to read or just unpleasing to your eye, select a new font by choosing "Tape Font. . .".

TapeCalc attempts to adjust the format of its numbers so they fit in the tape's width using the specified font, but the format of numbers already present on the tape is not changed when you change fonts. Thus if you switch to a larger font, some numbers already on the tape may be cut off at the left. You can select a font from 6 points to 20 points in size.

TapeCalc keeps track of numbers internally with the greatest accuracy it can manage. But you may not need to see a dozen decimal places and may in fact find too much detail distracting. TapeCalc lets you choose between full floating-point and two fixed-point representations. In "Floating point" mode, numbers are displayed with as many decimal places as needed. For example, press 7 and then 1/X and you will see 0.142857142857143. (If you have selected a particularly large font, you may not see as many digits as are here.)

In "Fixed - 2 decimals" mode, numbers are displayed with exactly two decimal places. This mode is convenient for calculations involving currency. Press 7 and then 1/X and you will see 1.14. But if you press 1/X again you'll get back the original 7. This shows that TapeCalc is rounding off the number it displays but retaining the exact number internally. "Fixed - 4 decimals" mode is exactly the same, but it displays four decimal places.

In the fixed-point modes, if the number becomes too wide for the tape it will be converted to scientific notation. In floating-point mode, TapeCalc will attempt to make the number fit by chopping off digits to the right of the decimal point. If that won't work, then the number is converted to scientific notation.

TapeCalc stores your preferences in TAPECALC.INI in the Windows directory. The .INI file has three sections: [Options], [Position], and [Font]. The [Options] section stores the values of the three options that you can set in the Options dialog box, along with whether or not the tape is visible and whether one is in fixed- or floating-point mode. A typical [Options] section might look like this:

```
[Options]
TapeLength=60 ;The tape holds 60 lines
PasteAddWhere=2 ;Insert an operator
                  ;at the end of pasted lines
```



```
PasteAddWhat=0 ;Insert the + operator
;at the end of pasted lines
TapeVisible=-1 ;The tape is visible
FixedFloat=1 ;Fixed mode, 2 decimal
;places
```

The [Position] section simply stores the top- and left-corner coordinates of the main window and the options dialog. TapeCalc positions itself at these same coordinates the next time it runs. The [Font] section stores the name and size of the selected font, along with whether or not the font is bold, italic, or both.

PROGRAMMING TAPECALC If you stop to think about the way a pocket calculator works, you'll realize that the same button doesn't always do the same thing. For example, sometimes the 1 button simply appends the digit 1 to a number, other times it wipes out the displayed number and starts a new number.

TapeCalc distinguishes four different states of the calculation process, along with a fifth state for overflow conditions. Some buttons do the same thing regardless of the current state. They are C, CE, $\pm$, M+, MS, MC, and $\uparrow$.

The effect of the remaining buttons depends on which state the calculator is in. Clicking a button or pressing a key calls a simple Dispatch subroutine, which calls the function appropriate to the current state. The possible states are STATE_FIRST, STATE_SECOND, STATE_OP, and STATE_FROZE. When the state isn't relevant, a procedure called Standard Action is used.

```
Sub Operate ()
' Perform the pending operation.
Dim Rslt#
On Error GoTo OFlow
UnHighlightOp
Select Case Op
Case OPS_NONE
Accum = 0
AddToTape PanelResult.Caption, "T"
AddToTape " ", ""
Exit Sub
Case OPS_PLUS
Rslt = Accum + Entry
Case OPS_MINUS
Rslt = Accum - Entry
Case OPS_TIMES
Rslt = Accum * Entry
Case OPS_DIVIDE
Rslt = Accum / Entry
'If you add a new binary operator, you need to add its
' operator constant to this Select Case statement, followed
' by code that implements the operation
Case OPS_POWER
Rslt = Accum ^ Entry
End Select
Accum = Rslt
Entry = Accum
Sync = SYNC_NumAhead
SyncUp
Exit Sub
```

STATE_FIRST is the initial state of the calculator. You can enter a number using any of the numeric entry buttons: digits, decimal point, backspace, and MR. If you press one of the binary operators (+, -, /, *, or ^), TapeCalc enters STATE_OP; if you press a unary operator ($\sqrt{}$ or 1/X), the result is frozen in STATE_FROZE.

STATE_OP is the state you enter when you press a binary operator. If you press another binary operator, you will stay in STATE_OP, but the current operator will change. Pressing a numeric entry button will switch TapeCalc to STATE_SECOND and start the process of receiving the second number. Pressing = will complete the calculation, ignoring the pending operator, and switch TapeCalc to STATE_FROZE. Pressing % makes no sense here, so TapeCalc rejects that.

STATE_SECOND is TapeCalc's state when receiving the second number of a calculation. The only way to reach this state is by pressing a numeric entry button after pressing a binary operator. If you press a binary operator again, TapeCalc will complete the pending calculation, use the result as the first number for another calculation, and return to STATE_OP. If you press = or %, TapeCalc completes the calculation and moves on to STATE_FROZE. And if you press a unary operator, TapeCalc performs the operation on the second number and goes to STATE_FROZE.

STATE_FROZE is entered when the

number in the display window is the result of a calculation and the number can't be edited (is "frozen"). This occurs when you press = or %, or when you calculate the square root or reciprocal of a number. Pressing a numeric entry button will wipe out the result and start a new calculation in STATE_FIRST. If you press a binary operator, TapeCalc will use the displayed number as the first number in a new calculation and return to STATE_OP. If you press $\sqrt{}$ or 1/X, TapeCalc performs the operation and remains in STATE_FROZE.

STATE_OVERFLOW is entered when you've attempted an illegal calculation such as division by 0, or your result is beyond the capacity of TapeCalc. Only C and CE are valid now. Pressing either clears the calculator completely and returns TapeCalc to STATE_FIRST.

REALISTIC BUTTONS You'll note that unlike most buttons in Windows programs, TapeCalc's buttons visibly depress when the corresponding key is pressed. The subroutines Form_KeyDown, Form_KeyPress, and Timer1_Timer work together to produce this effect. Because the main form's KeyPreview property is True, it gets first peek at all keystrokes. If the key in question is a plain character, its ASCII value is passed to the Form_KeyPress subroutine. If the key is one that doesn't have an ASCII equivalent (a *virtual key* in Windows parlance), TapeCalc checks its virtual key code in the Form_KeyDown subroutine.

In both functions, a simple Select Case

```
OFlow:
State = STATE_OVERFLOW
EntryStr = "Overflow"
PanelResult.Caption = EntryStr
AddToTape PanelResult.Caption, ""
Op = OPS_NONE
Exit Sub
End Sub

Function OpChar$ (TheOp#)
' Return the character corresponding to passed value
Select Case TheOp
Case OPS_PLUS
OpChar = "+"
Case OPS_MINUS
OpChar = "-"
Case OPS_TIMES
OpChar = "*"
Case OPS_DIVIDE
OpChar = "/"
'If you add a new binary operator, you need to add its
' operator constant to this Select Case statement, returning
' the character or string associated with the operator
Case OPS_POWER
OpChar = "^"
End Select
End Function
```



Figure 3: The Operate function processes the five existing binary operators. To add a new one, add to the Select Case statement.

statement translates the ASCII or virtual key code into one of TapeCalc's button constants. All of the buttons are elements of one big control array called TCBUTTON, and the button constants correspond to the indices of the buttons. For example, the index of ^ is 28, so the value of BTN_POWER is 28.

If the pressed key can be mapped to one of the buttons, the subroutine uses the Windows API function SendMessage to send a message to that button. Specifically, the subroutine sends the BM_SETSTATE message with a parameter of 1, which tells the button to display itself as pressed. Then it activates the timer with an interval of 0.3 seconds and dispatches the appropriate button constant for processing. When the timer function is called, it sends another BM_SETSTATE message to the pressed-down button with instructions to pop up again. Then the timer disables itself by setting the interval to 0. You may want to use this technique in your own programs. The visible feedback of an on-screen button depressing when a key-

board key is pressed will surely give the user a warm, fuzzy feeling.

EXTENDING TAPECALC TapeCalc handles all of the binary operators that I deemed necessary, but you may want to modify it to add more operators of your own. Here's how. Find the constant BTN_POWER in the main form's declarations section and add one to its value. Insert a new BTN_XXX constant for the new button and insert it before BTN_POWER, giving it BTN_POWER's previous value. Also add a new OPS_XXX constant, giving it the current value of OPS_POWER and incrementing OPS_POWER.

Select ^ on the form and set its Index property to the new value of BTN_POWER. Click on ^ again, press Ctrl-C to copy it to the clipboard, select the panel underlying the buttons, and press Ctrl-V to insert a copy. VB will automatically fill the copy's Index property with the first unused value, which should be the value of the new button constant. Give the new button a caption that reflects its function and then find a place

for it on the form.

In the Operate subroutine (see Figure 3), add lines to the Select Case statement to perform the newly defined operation. Don't worry about overflow conditions: They're handled automatically. Also add lines to the Select Case statement in the OpChar function to return the character or string that represents your new operation. If you run the modified program now, your new button should already be functional!

All that remains is to decide on a key mapping for the added button. If you choose a key that returns an ASCII code, you'll add to the Select Case statement in the Form_KeyPress subroutine. For example, if you selected the @ character, you'll add

```
Case 64 ' @
```

```
ButtonUp = BTN_MYNEWBUTTON
```

If you choose a key that returns a virtual key code, you'll need to add to the Select Case statement in the Form_KeyDown subroutine. All of the first ten



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function keys are in use: F1 is help, F2 through F9 are assigned to TapeCalc buttons, and F10 is the Windows standard key to activate the menu. A new operator could be assigned to F11 or F12 or to a shift combination with one of the function keys.

To assign Shift-F2 to a new button, for example, you'd modify the handling of VK_F2 as follows:

```
Case VK_F2
Select Case Shift
Case 0
    ButtonUp = BTN_PLUSMINUS
Case 1
    ButtonUp = BTN_MYNEWBUTTON
```

The Shift parameter of Form_KeyDown describes the shift buttons currently pressed. It's the sum of three possible val-

ues, 1 for Shift, 2 for Ctrl, and 4 for Alt. Thus if Ctrl-Alt is pressed, the value of Shift will be 6.

As you can see, it's easy to add new functions to TapeCalc. So if you need a function in CALC's Scientific mode that's not in TapeCalc, roll your own! □

NEIL J. RUBENKING IS TECHNICAL EDITOR OF PC MAGAZINE.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

TapeCalc

PURPOSE: TapeCalc is a streamlined, modern pocket calculator for Windows, with a simulated paper tape that makes it easy to check your work. Its fixed-point display option is handy for currency calculation, and you can paste calculations to and from the clipboard.

SETUP: To install TapeCalc, copy TAPECALC.EXE and TAPECALC.HLP into the directory of your choice, and add TapeCalc to the Program Manager group of your choice. TapeCalc requires that VBRUN300.DLL be in your Windows system directory, along with the .VBX controls CMDIALOG.VBX, KEYSTAT.VBX, THREED.VBX, and GRID.VBX. If these files are not on your system, download them from ZiffNet as VBRUN3.ZIP and TAPEC2.ZIP.

REMARKS: TapeCalc replaces the standard portion of the Windows calculator CALC.EXE; if you need hyperbolic cosines, standard deviation calculations, and so on, use CALC. For everyday work like balancing your checkbook, TapeCalc is the better choice.

From the Edit menu, you can copy all or part of the tape to the clipboard, or copy just the result of the current calculation. You can also paste calculations into TapeCalc. The View/Options dialog lets you choose to insert a specified operator between each number.

The tape itself can be hidden, though TapeCalc maintains the tape even when it's not visible. The tape font is under your control as well. All of TapeCalc's user-selectable options are stored in TAPECALC.INI, along with the screen position of TapeCalc itself and its options dialog.

TapeCalc can be used with the mouse or the keyboard, and the buttons depress visibly when the corresponding key is pressed. A NumLock button right on the calculator lets you enable the numeric keypad easily. For help with any button, click on it or press its key and then press F1.

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PC Solutions

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■ HARDWARE

Transferring Old Files

❓ I have a lot of important documents on an Atari 800XL, and I want to transfer them to WordPerfect on my PC. The Atari has a 25-pin male port in the back, and my PC has a 25-pin female port, but I don't know if the ports are compatible. I also have a 1,200-bps external modem with a 25-pin female port, if that would be of any use in solving my problem.

David L. Kerr
Riverside, California

► **PC MAGAZINE:** You may be able to connect the two computers, but there are a number of potential obstacles. This question (with varying details) gets asked fairly frequently, so I'll answer first in general terms, adding some specifics for the Atari at the end.

The easiest way to accomplish the transfer is to use a serial connection. You can then use a standard communications program—such as Windows Terminal—on the PC side to “catch” the data as it is sent out of the older computer's serial port. Getting the older system to start sending can be accomplished either by using a communications program or simply by instructing the computer to print the file to the serial port as if there were a serial printer attached. In either case, you may transmit some nonprintable characters, but if there is ASCII data in the original files, you should be able at least to capture the text.

To make the connection between the two computers, you need a null-modem cable, which reverses certain pairs of wires in the serial connection so that the two computers can communicate with each other. Such cables are readily available at retail stores and by mail.

The only remaining problem—and the one of particular interest in this case—is the matter of getting the correct gender connectors on the cable. Before the original IBM PC appeared, almost all serial ports were female. Modems, serial printers, and just about every other serial device on the market today is equipped with a female port. But not IBM PCs or compatible computers! These use male connectors for their serial ports, because IBM decided to make the parallel connector on the original PC a 25-pin female port instead of the larger Centronics connector used at that time for parallel connections. (Centronics connectors are still used on the printer end of almost all parallel connections).

From what I've been able to gather, the Atari 800XL also contradicted standard practice with its ports: The 25-pin male port you mentioned is most likely a serial port. Unfortunately, the 25-pin female port on your PC is almost certainly a parallel port, so you'll have to look for a 9-pin or 25-pin male connector on your system that would indicate a serial port. And since it is difficult to find a female-to-female serial cable, you'll probably have to go with a more typical male-to-female null-modem cable and then attach a gender-changer so that the cable can connect with the male connectors on both computers.

If you're likely to run across this kind of situation frequently, it might be handy

to gather a small kit of parts. With a 25-pin male-to-female cable, a null-modem adapter, two gender-changers (one male on both ends, and the other female on both ends), and a pair of 9-pin to 25-pin adapters, you should be able to handle just about any combination of connections you encounter.—*Alfred Poor*

■ OPERATING ENVIRONMENTS

Video Resolution Limits Number of Icons

❓ I am running Windows for Workgroups 3.11, and I'm wondering if there's a limit to the number of icons within one program group. I changed my video driver from one using 16 colors to one that uses 64K colors, and some of my icons were blacked out. In trying to replace them I received the message “Insufficient memory to perform this operation. Quit one or more Windows applications and try again,” after which the old icon disappeared. I have 8MB of RAM and a 2MB permanent swap file and I had no other apps open.

Dennis Long
Cerritos, California

❓ In an effort to consolidate my Windows desktop, I created a program group called Windows Applications, and an-

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PC DIRECT
starts here
with
exciting
offers from
top direct
vendors.

See index, page 290.

Elite Pentium™ Processor

The Power Is Building

The excitement is building...and so is MidWest Micro. In fact, we've been building for quite some time. Not just a line of Elite Computer Systems—but a reputation for quality and value. And now we'd like to invite you to watch. Welcome to one of our works in progress—Elite Pentium™ Processor Based Systems.



Zoned For 100 MHz

When our developers first considered a Pentium project, they started by gathering the proper materials. And of course the raw power of Intel's Pentium processor was the very first item on everyone's list. In fact, this Elite line was designed to include four different levels of Pentium power—giving you P5-60, P5-75, P5-90 and P5-100 Systems to choose from. And in case the CD-ROM drives, fax modems and other extras built into these Elite PCs aren't enough to rattle your rafters, we've got plenty of add-ons in our product line for endless Pentium possibilities.



Based Systems...

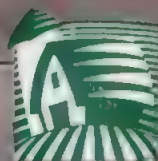
Opening Doors Of Communication

We've gotta hand it to those MidWest architects. With PCI framework built into every Pentium Processor Based Elite, you'll reach the maximum capacity in all your applications. That's because PCI Local Bus technology moves data across wide 32-bit beams—giving you quick access to your peripherals and hard drive. And when you combine PCI with the Intel Pentium chip, overall performance simply goes through the roof!

Hats Off To More Software

You don't need a hard hat to inspect *this* part of your Elite PC. Dwelling inside each Elite Pentium Processor Based System is a bundle of exciting multimedia software. And with Microsoft® titles like MS® Office Professional, Encarta™, Money, Bookshelf® '94 and Dangerous Creatures at your fingertips, you'll have no trouble finishing the daily projects *you* undertake.

Call your MidWest contractor today and we'll build an Elite Pentium Processor Based System just right for *your* lot.



MIDWEST
MICRO

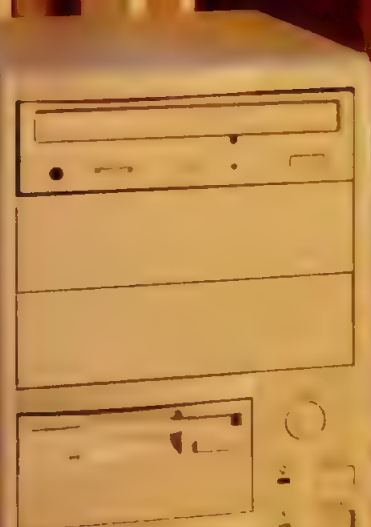
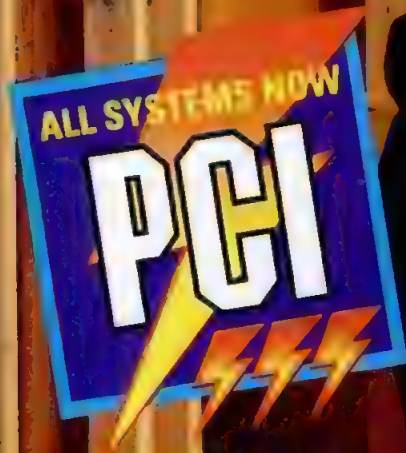
IT'S IN OUR NATURE

1-800-682-7256

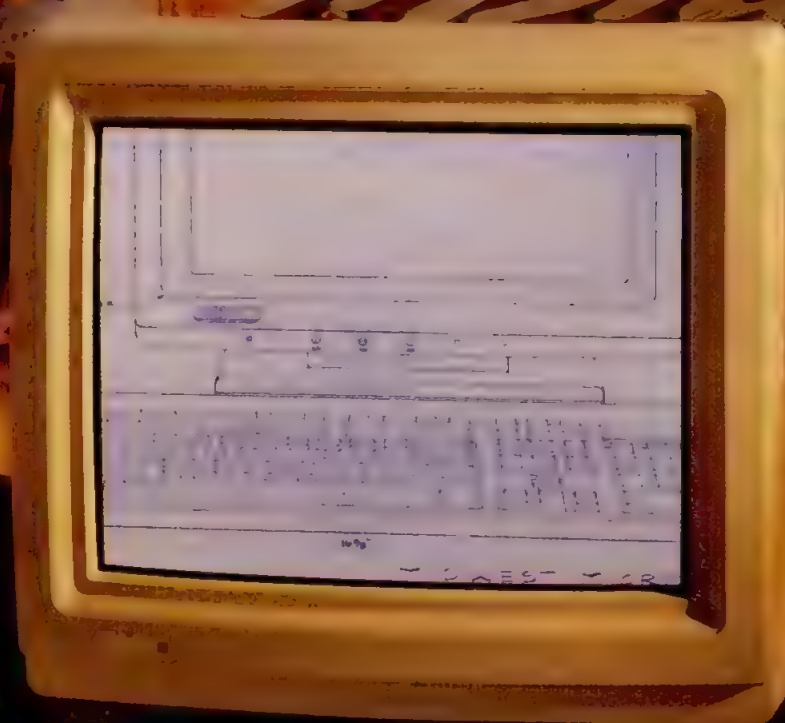
Peripherals

1-800-445-2794

AD#G02



Get out your measuring tape — here's something that might surprise you. Perfect for your home or workshop, the mini-tower case shown here is equipped with three 5.25" and five 3.5" drive bays — but it still maintains compact dimensions of 15" high by 6.5" wide. Midwest Micro believes in expanding your options...not the size of your computer.



Plug Into PCI

Tired of PCs that are too much like work? Then get ready for pure high-tech electricity. Elite PCI Systems combine advanced PCI Local Bus technology with powerful Intel® processors — giving you access to a new brand of power tools...

Safety Goggles Optional

The 32-bit current running through every Elite PCI System delivers high-voltage video and shocking peripheral performance. We're talking an information flow of up to 132 Mbps! And even though MidWest Micro practically overloads your computer with extras like fax modems, CD-ROM drives and graphic accelerators, you never have to worry about blowing a fuse — PCI technology supports up to 10 peripherals without so much as a short in the system.

Go Ahead, Try This At Home

The only danger involved in owning an Elite Home PC, is never wanting to leave the house again. These PCI Systems come wired with double speed CD-ROM drives and multimedia bundles your entire crew will enjoy. And with Intel486™ and Pentium™ processors to choose from, you're sure to find a Home PC with just the right wattage for your household projects.

Watch The Sparks Fly

If what you need is an outlet for speed, check out MidWest's DX4 PCI Systems. These Elite PCs come with powerful IntelDX4 motors for processing speeds up to 100 MHz! You won't find a faster 486 system...in anyone's toolbox! No matter which Elite power tool you choose, you'll always have a handle on high performance. Call MidWest Micro today and get ready for a PCI power surge!



**MIDWEST
MICRO**

IT'S IN OUR NATURE

1-800-682-7256

The Elite SoundBook —An Exciting Breakthrough In Portable Computing

Life is full of little surprises. One minute you're climbing the ladder of success — the next minute your world is crashing down all around you. So in order to be prepared for *your* next surprise, make sure there's always an Elite SoundBook in your toolbox. This powerful 486 notebook comes with business audio features, Advanced Power Management and your choice of screen, hard drive and processor up to DX4-100 — but it still manages to weigh in at less than seven pounds. Why did we make the Elite SoundBook so small? Because sometimes you need to get *into* a tight spot... to get *out* of one.

Features That'll Floor You

No matter how your new Elite SoundBook is configured, you'll always enjoy crystal clear audio and video. And that's definitely a must when you're working in unfamiliar surroundings. The SoundBook's special software, microphone and speaker let this amazing notebook talk you through even the toughest projects — just in case your hands are full. And since MidWest knows you've got *enough* headaches, each SoundBook comes with a crisp 9.5" monochrome, 10.5" dual-scan color or 9.5" active-matrix color display that's perfect for hours of comfortable viewing. Plus, you'll never have to worry about extension-cord safety — the SoundBook's nickel metal hydride battery keeps working until the job's done!

Dig Your Phone Out Of The Wreckage And Give Us A Call

If you still think a computer system has to be a permanent fixture on your desktop, let the Elite SoundBook remodel your mind. And if you're *really* buried under your work, the Elite SoundBook Plus is available with a 75-MHz or 90-MHz Intel Pentium-Processor! Calling MidWest Micro may have been the smartest decision Eugene ever made. Who knows, he might even have time to clean the attic before his wife comes home.

"The Elite SoundBook DX4-100
is the fastest notebook
I've ever used."

Minutes ago, Eugene had no idea that his dining room ceiling couldn't support a 50 pound chandelier. He also had no idea how filthy his attic really was. Now he is painfully aware of both. He is also painfully aware that his wife is due home in less than one hour. Luckily, his SoundBook survived the mishap.



Elite Home PCs

486DX2-50 \$1499

- #008701
- ▶ Intel 486™ DX2-50 Processor
 - ▶ 4 Mb RAM, 128 Kb Cache
 - ▶ 428 Mb IDE Hard Drive
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ PCI Fast IDE Interface
 - ▶ Double Speed CD-ROM Drive
 - ▶ Microsoft® Family Bundle — Encarta™, Works, Money, Scenes, Dangerous Creatures & Golf
 - ▶ 16-Bit Stereo Sound Card
 - ▶ Digital Quality Speakers
 - ▶ 9624 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS® 6.22 and WFW 3.11
 - ▶ EPA Energy Star Compliant
 - ▶ The Real 3 Year Warranty

486DX2-66 \$1599

#008702

486DX4-100 \$1999

- #008703
- ▶ IntelDX4™ 100 Processor
 - ▶ 8 Mb RAM, 128 Kb Cache
 - ▶ 545 Mb IDE Hard Drive
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ PCI Fast IDE Interface
 - ▶ Double Speed CD-ROM Drive
 - ▶ Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
 - ▶ 16-Bit Stereo Sound Card
 - ▶ Atec Lansing Stereo Speakers
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ EPA Energy Star Compliant
 - ▶ The Real 3 Year Warranty

486DX4-75 \$1899

#008704

P5-75 \$2299

- #008705
- ▶ Intel® 75 MHz Pentium™ Processor
 - ▶ 8 Mb RAM, 256 kb Cache
 - ▶ 850 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
 - ▶ 16-Bit Stereo Sound Card
 - ▶ Atec Lansing Stereo Speakers
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ The Real 3 Year Warranty

P5-60 \$2199

#008706

P5-90 \$2599

- #008707
- ▶ Intel 90 MHz Pentium Processor
 - ▶ 8 Mb RAM, 256 Kb Cache
 - ▶ 850 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
 - ▶ 16-Bit Wavetable Sound Card
 - ▶ Atec Lansing Stereo Speakers
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ The Real 3 Year Warranty

P5-100 \$2999

#008708

- ▶ With 1 Gb Hard Drive

P5-100 \$3499

- #008709
- ▶ Intel 100 MHz Pentium Processor
 - ▶ 16 Mb RAM, 256 kb Cache
 - ▶ 1 Gb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb
 - ▶ Quad Speed CD-ROM Drive
 - ▶ Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
 - ▶ 16-Bit Wavetable Sound Card
 - ▶ Atec Lansing Stereo Speakers with Subwoofer
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 17" .28 Digital Color Monitor
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ The Real 3 Year Warranty

P5-90 \$3199

#008710



Elite Office PCs

DX2-50 PCI \$1199

- #008711
- ▶ Intel 486 DX2-50 Processor
 - ▶ 4 Mb RAM, 128 Kb Cache
 - ▶ 428 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ 3.5" Disk Drive
 - ▶ 14" SVGA .28 V/L Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 3 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ 101-Key Enhanced Keyboard
 - ▶ High-Resolution Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS® Works for Windows™ 3.0
 - ▶ EPA Energy Star Compliant
 - ▶ The Real 3 Year Warranty

DX2-66 PCI \$1299

#008712

DX2-50 PCI \$1499

- #008713
- ▶ IntelDX2 50 Processor
 - ▶ 4 Mb RAM, 128 Kb Cache
 - ▶ 545 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 9624 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 3 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ 101-Key Enhanced Keyboard
 - ▶ High-Resolution Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Word 6.0, Bookshelf® 99, Encarta Works Multimedia Edition 3.0 & Money 3.0
 - ▶ EPA Energy Star Compliant
 - ▶ The Real 3 Year Warranty

DX2-66 PCI \$1599

#008714

DX4-75 PCI \$1799

- #008715
- ▶ IntelDX4 75 Processor
 - ▶ 8 Mb RAM, 128 Kb Cache
 - ▶ 545 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 3 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Word 6.0, Bookshelf® 99, Encarta Works Multimedia Edition 3.0 & Money 3.0
 - ▶ EPA Energy Star Compliant
 - ▶ The Real 3 Year Warranty

DX2-66 PCI \$1749

#008716

DX4-100 PCI \$1899

#008717



All Systems with a CD-ROM include TestDrive CD Software and Microsoft Home CD Sampler

Elite Office PCs (Continued)

DX4-100 PCI \$1999

- #008718
- ▶ Intel DX4-100 Processor
 - ▶ 8 Mb RAM, 128 Kb Cache
 - ▶ 850 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
 - ▶ EPA Energy Star Compliant
 - ▶ The Real 3 Year Warranty

P5-75

- #008719
- ▶ Intel 75 MHz Pentium Processor
 - ▶ 8 Mb RAM, 256 Kb Cache
 - ▶ 545 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ PCI Local Bus Graphics with 1 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
 - ▶ The Real 3 Year Warranty

P5-60

#008720

\$1999 P5-75

- #008721
- ▶ Intel 75 MHz Pentium Processor
 - ▶ 8 Mb RAM, 256 Kb Cache
 - ▶ 850 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
 - ▶ The Real 3 Year Warranty

\$2299 P5-90

- #008722
- ▶ Intel 90 MHz Pentium Processor
 - ▶ 8 Mb RAM, 256 Kb Cache
 - ▶ 545 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Office Professional, Bookshelf '94 & Encarta
 - ▶ The Real 3 Year Warranty

\$2499

P5-90

- #008723
- ▶ Intel 90 MHz Pentium Processor
 - ▶ 16 Mb RAM, 256 Kb Cache
 - ▶ 850 Mb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb
 - ▶ Double Speed CD-ROM Drive
 - ▶ 28.8 S/R Fax Modem
 - ▶ 3.5" Disk Drive
 - ▶ 15" SVGA .28 Digital Color Monitor with Hitachi CRT
 - ▶ 8-Bay Mini-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Signature 101-Key Enhanced Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Office Professional, Bookshelf '94
 - ▶ The Real 3 Year Warranty

\$2999

P5-90

- #008725
- ▶ Intel 90 MHz Pentium Processor
 - ▶ 16 Mb RAM, 256 Kb Cache
 - ▶ 1 Gb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb VRAM
 - ▶ Quad Speed CD-ROM Drive
 - ▶ 14.4 Fax Modem with Voicemail
 - ▶ 3.5" Disk Drive
 - ▶ 17" .26 1600 x 1200 ExactMatch Color Monitor
 - ▶ 10-Bay Full-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Microsoft Natural Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Office Professional, Bookshelf '94 & Encarta
 - ▶ The Real 3 Year Warranty

\$3499

P5-100

- #008726
- ▶ Intel 100 MHz Pentium Processor
 - ▶ 16 Mb RAM, 256 Kb Cache
 - ▶ 1 Gb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb VRAM
 - ▶ Quad Speed CD-ROM Drive
 - ▶ 28.8 S/R Fax Modem
 - ▶ 3.5" Disk Drive
 - ▶ 17" .26 1600 x 1200 ExactMatch Color Monitor
 - ▶ 10-Bay Full-Tower Case
 - ▶ 4 ISA, 2 PCI & 1 PCI/ISA Slots
 - ▶ Super I/O using 16550 UART & ECP/EPP
 - ▶ Microsoft Natural Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Office Professional, Bookshelf '94 & Encarta
 - ▶ The Real 3 Year Warranty

\$3999

P5-75

#008724

\$2799

P5-100

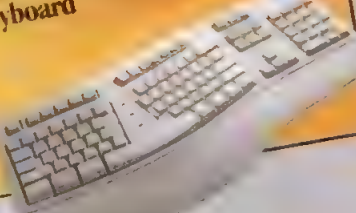
- #008727
- ▶ Intel 100 MHz Pentium Processor
 - ▶ 16 Mb RAM, 256 Kb Cache
 - ▶ 1 Gb IDE Hard Drive
 - ▶ PCI Fast IDE Interface
 - ▶ ATI MACH 64 PCI Accelerator with 2 Mb VRAM
 - ▶ Quad Speed CD-ROM Drive
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 - ▶ Microsoft Natural Keyboard
 - ▶ Microsoft Mouse
 - ▶ MS-DOS 6.22 and WFW 3.11
 - ▶ MS Office Professional, Bookshelf '94 & Encarta
 - ▶ The Real 3 Year Warranty

\$4199

Monitor & Keyboard Upgrades

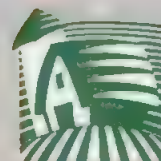
Ask your sales representative how you can upgrade your monitor to a 15" or a 17" Elite Monitor and your keyboard to a Microsoft Natural keyboard.

14" to 15"	\$69
15" to 17"	\$249
15" to 17" ExactMatch	\$339
17" to 21" ExactMatch	\$769
Microsoft Natural Keyboard	\$59



Customizing Your System

If you don't see a system configuration which meets your needs, we'll be glad to customize a system for you. Choose your own case design, amount of RAM, hard drive size and other add-ons such as modems and multimedia kits.



MIDWEST MICRO

IT'S IN OUR NATURE

Systems

1-800-682-7256

Peripherals

1-800-445-2794

Elite SoundBook Plus Based On Intel's Pentium™ Processor



- ▶ Intel® Pentium™ 90 or 75 MHz Processor
- ▶ 64-Bit, 256k Synchronous Burst External Cache
- ▶ 64-Bit, 8 Mb RAM (expands to 40 Mb)
- ▶ 10.3" Dual-Scan or 10.4" Active-Matrix VGA Display

- ▶ PCI Local Bus HDD Controller
- ▶ Sound Blaster® (Sound Blaster & Windows™ Sound System Compatible)
- ▶ Built-in Stereo Speakers & Microphone
- ▶ External Jacks for Line In & Line Out
- ▶ 3.5" Built-in Disk Drive
- ▶ User Replaceable Hard Drive
- ▶ Two Type II/One Type III PCMCIA Slot
- ▶ Built-In Track Point Style Pointing Device
- ▶ NiMH Battery & AC Adapter
- ▶ Advanced Power Management
- ▶ Bi-directional EPP/ECP Parallel Port
- ▶ High Speed 16550 UART Serial Port
- ▶ Infra Red Wireless "IR" Interface
- ▶ External VGA & Keyboard/Mouse Port
- ▶ MS-DOS® 6.22 & WFW 3.11
- ▶ Microsoft® Works for Windows 3.0 & Golf
- ▶ Lotus® Organizer
- ▶ Weight: 6.8 lbs.
- ▶ Carrying Case
- ▶ One Year Manufacturer's Warranty

Dual-Scan Color SoundBook Plus

P5-75 with 340 Mb HDD	#008090	\$2999
P5-90 with 340 Mb HDD	#008029	\$3599
P5-90 with 520 Mb HDD	#008025	\$3799
P5-90 with 720 Mb HDD	#008026	\$3999

Active-Matrix Color SoundBook Plus

P5-75 with 340 Mb HDD	#008091	\$4499
P5-90 with 520 Mb HDD & 16 Mb of RAM	#008027	\$5499
P5-90 with 720 Mb HDD & 24 Mb of RAM	#008028	\$5999



Elite SoundBook



- ▶ Intel® 86™, Intel® DX2™ or Intel® DX4™ Processor
- ▶ 4 Mb RAM (expands to 20 Mb)
- ▶ 9.5" Mono, 10.3" Dual-Scan or 9.5" Active-Matrix VGA Display
- ▶ Local Bus Video with 1 Mb Video DRAM
- ▶ Business Audio Features Including:
 - Built-in Microphone & Speaker
 - External Jacks for Line In & Line Out
- ▶ 3.5" Built-in Disk Drive
- ▶ User Replaceable Hard Drive
- ▶ Two Type II/One Type III PCMCIA Slot
- ▶ Built-in Trackball
- ▶ NiMH Battery & AC Adapter
- ▶ Advanced Power Management
- ▶ One Parallel & One Serial Port
- ▶ External VGA & Keyboard Port
- ▶ MS-DOS 6.22 & WFW 3.11
- ▶ Microsoft® Works for Windows 3.0 & Golf
- ▶ Lotus® Organizer
- ▶ Weight: Mono-6.2 lbs. Color-6.7 lbs.
- ▶ Carrying Case
- ▶ One Year Manufacturer's Warranty

Dual-Scan Color SoundBook

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other group called Odds and Ends to hold any miscellaneous files associated with those programs. In the process of adding files to the Odds and Ends program group, an error message appeared to tell me I had insufficient memory to perform the operation, and to close one or more applications and try again. I have 8MB of RAM on my system with a 19MB permanent swap file. Can you tell me what's causing the problem, and how to rectify it.

Bruce Fong
Syracuse, New York

► **PC MAGAZINE:** There is indeed a limit, and it's related strictly to video mode, not to available system memory. In 64K-color ("high color") mode, empirical testing shows that Program Manager permits no more than 28 icons in a group. In 24-bit color ("true color"), the limit is 15 icons. Why is this? Program Manager has a hard-coded limit of 50 icons per group, but it also has a more subtle limit: The memory used by all the icons in a group must not exceed 64K. Although icon images are stored on disk as device-independent bitmaps, when loaded into memory they're adjusted to the current video

mode. The more colors available, the more bits it takes to represent each pixel, and the more memory the icon occupies. That's why the number of icons you can use diminishes as the number of available colors increases.

Unfortunately, when you try to add one icon too many, Windows misleads you. It says you have insufficient memory and recommends that you quit one or more applications. In fact, the problem has nothing to do with available memory, and quitting applications won't help. Worse yet, if you switch to a new video mode that doesn't support the number of

icons you're already using, Windows erroneously tells you that you can fix the blacked-out icons using Program Manager's File | Properties dialog.

The only real solution is to adjust the number of icons in your groups to suit the video resolution you intend to use. If you're switching to a higher resolution, make this adjustment first.

—Neil J. Rubenking

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Creating Unique Filenames

❓ I use a batch file to copy files to a central directory. I'd like to find a way to assign unique names to these files. Do you know if there is a way to do this?

Gerrit Swets
Grand Rapids, Michigan

► **PC MAGAZINE:** Whenever you use the pipe character (|) to redirect the output of one program as input for another program, DOS itself creates at least one unique filename based on the current date and time. DOS stores the output of the first program in a uniquely named file in your TEMP directory, passes that file as input to the second program, and then deletes the file. All you need to do is find a way to take advantage of the unique filenames that DOS creates for itself.

The batch file UNIQUE.BAT (Figure 1) grabs one of those filenames and stores it in an environment variable. To start, UNIQUE.BAT sets the TEMP environment variable to a newly created directory, saving the old value of TEMP for later restoration. Then UNIQUE.BAT takes a


```
@ECHO OFF
SET ot=%TEMP%
MD \($$$$$$)
SET TEMP=\($$$$$$)
REM | DIR /B \($$$$$$) > TEMPFILE.DAT
ECHO.>>TEMPFILE.DAT
RD \($$$$$$)
SET TEMP=%ot%
SET ot=
DATE < TEMPFILE.DAT | FIND "Enter" > TEMPFILE.BAT
ECHO SET UNIQUE=%4>ENTER.BAT
CALL TEMPFILE.BAT
DEL TEMPFILE.?AT
DEL ENTER.BAT
ECHO Unique filename: "%UNIQUE%"
```



Figure 1: Any batch file can call on UNIQUE.BAT to get a unique filename.

snapshot of the contents of that directory right in the middle of a piping operation. The resulting file TEMPFILE.DAT contains two unique filenames. UNIQUE.BAT then uses an arcane batch file technique described in the User-to-User column of November 9, 1993 to process TEMPFILE.DAT and get the first of the two filenames into the environment variable UNIQUE. Your batch files can CALL UNIQUE.BAT any time they need a unique filename.

—Neil J. Rubenking

WORD PROCESSING Changing Printers in WinWord 6.0

❓ I have three printers and a fax modem (plus Delrina WinFax) on my system, and I'd like to add a print button for each choice to my Microsoft Word for Windows toolbar. However, I haven't been able to create the macros I need. For the HP DeskJet, for example, I created the

following two-line (not counting the Sub MAIN and End Sub statements) macro:

```
FilePrintSetup .Printer =
    "HP DeskJet 500 Printer on COM2:"
FilePrintSetup .Options
```

This opens the setup dialog box for the DeskJet and lets me set the graphic density, paper size, and so on. Once I choose OK, however, WinWord simply returns to the document without doing anything. Is there a way to write a macro that will set the printer, let me set the options, and then go ahead and print?

Fred Wagner
Lafayette, California

►PC MAGAZINE: Actually, the macro you've written does more than you think. If you run it and choose File Print, you'll find that the printer in the Print dialog box matches the printer name defined in the first line of the macro. To see this, just open the Print dialog box, choose Printer to open the Print Setup dialog box, and then choose Options to open the printer

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4/50 Model 343W	9.5" Active	340MB	\$3629
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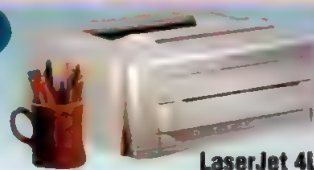
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486SX2/50	8.4" Active	340MB	\$3099
486DX2/50	9.5" Dual Scan	340MB	\$3049
486DX2/50	8.4" Active	455MB	\$3649
486DX4/75	9.5" Dual Scan	455MB	\$3999
486DX4/75	8.4" Active	340MB	\$4889
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486SX2/50	4MB	270MB	\$1169
486DX2/50	4MB	420MB	\$1379
486DX2/66	4MB	420MB	\$1499
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Processor	Screen	Hard Drive	Price
486DX2/40	9.5" Dual Scan	170MB	\$2739
486DX2/40	8.4" Active	170MB	\$3219
486DX2/40	8.4" Active	340MB	\$3689
486DX2/50	9.5" Active	340MB	\$4539
486DX4/75	9.5" Active	340MB	\$5099
486DX4/75	9.5" Active	510MB	\$5479

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- ▲ 2 Type II or 1 Type III PCMCIA slots
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Display	Hard Drive	Price
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486DX4/75	540MB	Active	\$4729
486DX4/75	540MB	High Res.	\$5099
486DX4/100	810MB	Active	\$5569
Pentium 75	540MB	Active	\$5389
Pentium 75	810MB	Active	\$5899

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- ▲ Removable hard drive
- ▲ Removable floppy - add second battery
- ▲ MS-DOS 6.21, Windows 3.1, built-in trackball

Processor	Screen	Hard Drive	Price
486DX2/50	9.5" Dual Scan	250MB	\$2499
486DX2/50	9.5" Dual Scan	340MB	\$2669
486DX2/50	9.5" Active	250MB	\$3249
486DX2/50	9.5" Active	340MB	\$3399
486DX2/50	9.5" Active	540MB	\$3779
486DX4/75	9.5" Active	340MB	\$3879
486DX4/75	9.5" Active	540MB	\$4249

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Processor	Hard Drive	Price
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486DX2/66 Desktop	340MB	\$1479
486DX2/66 Minitower	420MB	\$1539
P60 Minitower	420MB	\$1899

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486SX/33	9.5" Dual Scan	210MB	\$1429
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T1960	486DX2/50	9.5" Dual Scan	200MB	\$2159
T1960	486DX2/50	9.5" Dual Scan	320MB	\$2329
T1960	486DX2/50	8.4" Active	200MB	\$2749
T1960	486DX2/50	8.4" Active	320MB	\$2919
T2400	486DX2/50	9.5" Dual Scan	250MB	\$2749
T2400	486DX2/50	9.5" Dual Scan	320MB	\$2879
T2400	486DX2/50	8.4" Active	250MB	\$3299
T2400	486DX2/50	8.4" Active	320MB	\$3419

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T4700	486DX2/50	9.5" Active	200MB	\$3429
T4700	486DX2/50	9.5" Active	320MB	\$3629
T4800	486DX4/75	9.5" Active	500MB	\$4799
T4850	486DX4/75	10.4" Active	500MB	\$5199
T4850	486DX4/75	10.4" Active	772MB	\$5569

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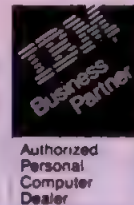
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Processor	Screen	Hard Drive
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486SL/33	9.5" Mono	340MB
486SL/33	9.5" Dual Scan	170MB
486SL/33	9.5" Dual Scan	340MB
486SL/33	8.4" Active	170MB
486SL/33	8.4" Active	340MB
486DX2/50	9.5" Dual Scan	340MB
486DX2/50	9.5" Dual Scan	540MB
486DX2/50	8.4" Active	340MB
486DX2/50	8.4" Active	540MB

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- ▲ Two Type II or one Type III PCMCIA slot
- ▲ MS-DOS Windows for Workgroups, Microsoft Sound System
- ▲ 3-Year Warranty

Processor	RAM	Screen	Hard Drive	Price
486SX 33	4MB	10.4" Mono	200MB	\$2289
486DX2/50	4MB	10.3" Dual Scan	200MB	\$2759
486DX2/50	4MB	10.3" Dual Scan	340MB	\$2969
486DX2/50	4MB	9.5" Active	340MB	\$4099
486DX2/50	8MB	9.5" Active	450MB	\$4419
486DX4/75	8MB	9.5" Active	520MB	\$4989

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```

Sub MAIN
FilePrintSetup .Printer = "Put Printer Name in Quotes HERE"
FilePrintSetup .Options
Dim PrintThis As FilePrint
On Error Goto DontPrint
Dialog PrintThis
FilePrint PrintThis
DontPrint:
End Sub

```



Figure 2: SETPRN is a WinWord 6.0 macro that automatically sets Windows to use a given printer, opens the Options dialog box for that printer, and then opens WinWord's Print dialog box so you can print.

driver setup dialog box. You'll find that any settings you made to the printer options while running the macro will still match the way you set them. Assuming the name you specify in each macro matches that of a device installed on your system, the same is true of the equivalent macros for your other two printers and for WinFax.

In short, once you've set the printer driver and printer options with the macro, all you need do is issue the actual print command. The listing shown in Figure 2 modifies your macro to do this. The modified macro is available for downloading as SETPRN.TXT from the Utilities/Tips Forum on PC MagNet. You can add it to your toolbar by using the Tools | Customize command.

The three crucial lines in the listing are:

```

Dim PrintThis As FilePrint
Dialog PrintThis
FilePrint PrintThis

```

The first line uses the Dim statement to create PrintThis, which is simply a carbon copy of WinWord's built-in FilePrint dialog record. The second line opens the Print dialog box so you can change the settings before choosing OK. Note that in cases where printer drivers include settings that duplicate WinWord's own print options—for things like paper-tray selection—the WinWord settings will normally prevail. The third line gives the command to print the file, using the current settings in the PrintThis dialog record. If you'd rather set the printer and then immediately print without stopping to set options, just omit the FilePrintSetup .Options line.

The two remaining lines in the macro are the label DontPrint, at the end of the

macro, and the On Error statement, On Error Goto DontPrint. If you omit these lines the macro will still work, but you'll get a WordBasic error message if you choose Cancel from the Print dialog box. Retain these lines, and WordBasic will skip the error message, jump to the DontPrint label, and gracefully end the macro.

It's sometimes a good idea to separate the setup and print functions. I've long used macros similar to that in Figure 2 (without the line for setting options) for selecting the printer or fax driver. The macros let me change to a different printer or to WinFax and see the effect (if any) on formatting before I print.

In making any variations on this macro, however, remember that the printer name and port defined in the macro must *exactly* match the printer name and port specified in the Print Setup dialog box. To avoid typographical errors, you may want to create that part of the macro by recording it and then add the rest of the macro by editing it directly.

—M. David Stone

SPREADSHEETS

Parsing Labels in Excel

?A novice at our office entered a column of several hundred dates in a Microsoft Excel spreadsheet in the form 08/15-09/06. Of course, Excel read these as labels, not as dates. The easiest way to convert these labels to dates is to copy the column into a second column, and then delete the first date in one column and the second date in the second column.

Deleting a date used to be simple: To delete the first date, for example, press F2 to get into edit mode, press Home to get to the first character of the string, then press the Del key enough times to wipe out everything up to the hyphen. In the

old days of DOS spreadsheets, you could simply record these keystrokes. If you wanted to be fancy, you could embed the resulting macro in a loop that continued until a blank cell was encountered. Since Excel now records the results of your keystrokes, not the keystrokes themselves, this method doesn't work.

How can I write a macro in Excel that converts these dates to a usable format?

*Michael Trombetta
Manhasset, New York*

►PC MAGAZINE: In Excel 5.0, the simplest way to solve this problem is not to use a macro. Instead, do the following:

1. Make sure you have a blank column next to the column of date labels.
2. Select all the date labels to be fixed.
3. Choose Text-to-Columns from the Data menu.
4. In the first dialog box of the Text-to-Columns wizard, make sure the Delimited option is selected. Then click Next.
5. In the wizard's second dialog box, click the check box labeled Other, put a hyphen in the box to the right of Other, and then click Finish.

That's all there is to it. Excel parses your labels, putting everything to the right of the hyphen in your second column and leaving the rest (sans hyphen) in the column you selected.

If you want to get fancy, choose Insert | Macro | Module. Then enter the following Visual Basic for Applications code into the new macro sheet:

```

Sub FixLeft()
  For Each DateLabel In Selection
    DateLabel.Value = Left _
      (DateLabel.Value, InStr _
        (DateLabel.Value, "-") - 1)
  Next DateLabel
End Sub

```

```

Sub FixRight()
  For Each DateLabel In Selection
    DateLabel.Value = Right _
      (DateLabel.Value, Len _
        (DateLabel.Value) - InStr _
          (DateLabel.Value, "-"))
  Next DateLabel
End Sub

```

To use these macros, first copy your column of date labels into an adjacent col-

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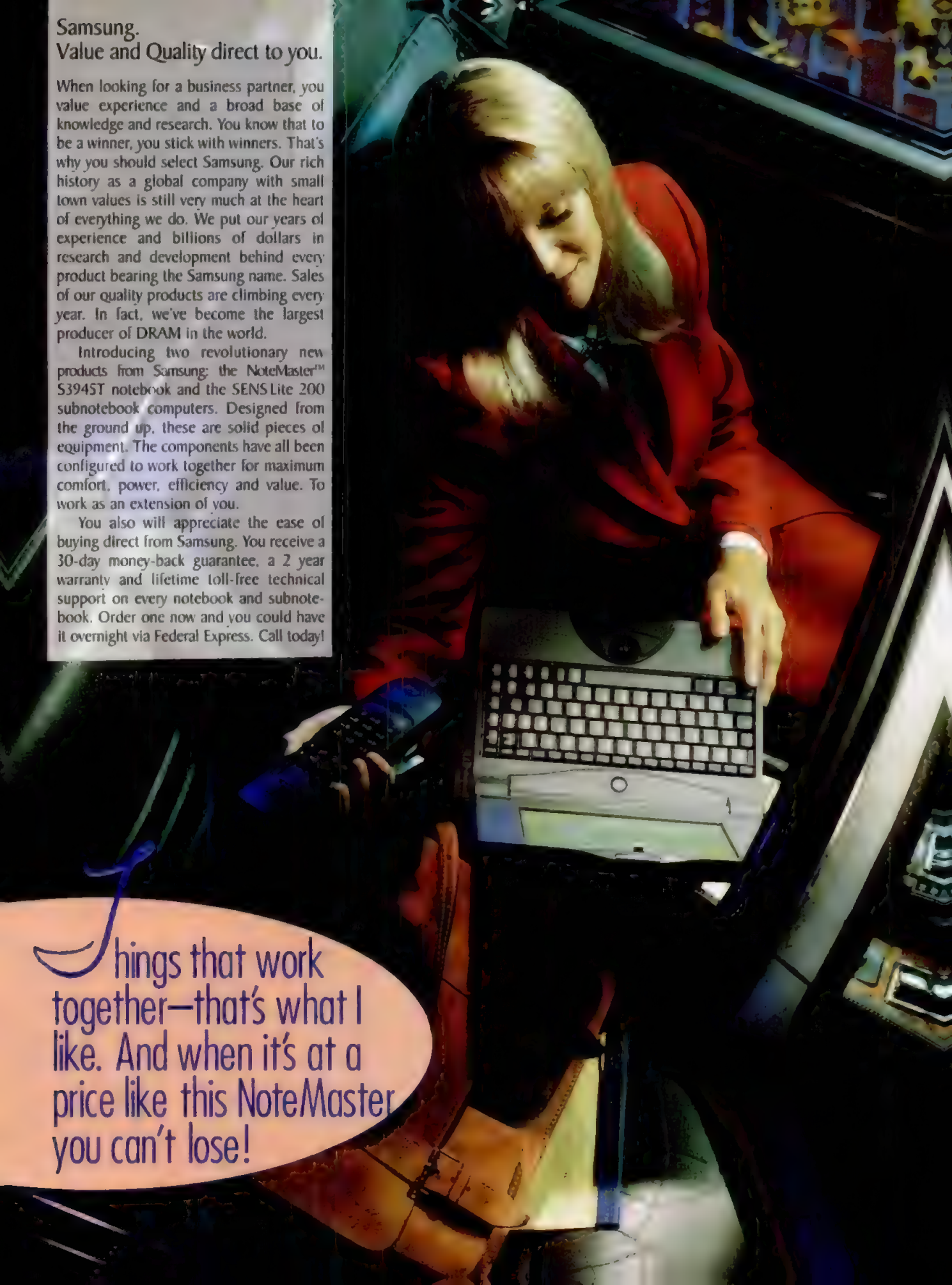
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A woman with blonde hair, wearing a red blazer, is seated in the driver's seat of a car. She is smiling and looking down at a silver Samsung NoteMaster laptop resting on her lap. Her right hand is on the laptop's keyboard, and her left hand is holding a small, dark-colored mobile phone. The car's interior, including the dashboard and steering wheel, is visible in the background. The lighting is dramatic, with strong highlights and shadows.

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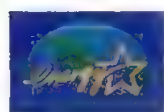


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umn. Then select the first column of labels, choose Tools | Macro, and select FixLeft from the list of macros that appears. Then select the second column, choose Tools | Macro, and select FixRight.

The macros use simple string formulas to modify the contents of your labels. Another way you can attack this problem is to apply the formulas directly—without the helping hand of a macro—in worksheet cells. For this to work, though, you need to use Excel's string-handling syntax, in place of VBA's. The Excel formula that strips off everything from the hyphen to the right side of cell A1 is

```
=LEFT(A1, FIND("-", A1) - 1)
```

The formula to extract everything to the right of the hyphen in cell A1 is

```
=RIGHT(A1, LEN(A1) - FIND("-", A1))
```

Enter these formulas with references to the first cell in your set of date labels, replicate downward, and you're done.

—Craig Stinson

■ DATABASES

Add a Query Builder to Your App

► **PC MAGAZINE:** Most database applications have the need to query the database—that is, to find records based on some user-specified criteria. Once you obtain a query result, you need to do something with it. For example, you could place the result in a Browse window or

print a report. Writing custom code to do this for every application is cumbersome, and besides, what you really need is a flexible, search-any-field query engine that's customizable, right? If this sounds familiar and you use Clipper, dBASE IV, or FoxPro, consider trying Query Maker, from Strategic Edge. Query Maker is a royalty-free query builder that you can incorporate into your applications and that comes with complete source code.

Query Maker lets you set up field descriptions and picture clauses in a data dictionary table. Your user can then select fields for comparison by choosing from a list of English field descriptions instead of cryptic field names (see Figure 3). To create a query condition, you first choose a field. Then you choose an operator, such as "Greater than" or "Contains text" (see Figure 4). Next you type in a value, and that completes the condition. You can expand the query by choosing a connector (AND or OR) and adding other conditions (you can have up to ten). To create multitable queries, you pass Query Maker a join condition or, in some circumstances, let Query Maker generate the join for you. In the FoxPro version (\$149, the one I looked at), you can direct query results to a variety of output destinations, including a Browse window, a report, a database, an ASCII text file, or several other file formats.

The product includes a front-end query list manager that you can incorporate into your applications. This lets you save named queries for reuse (see Figure 5).

Incorporating Query Maker into your application requires very little effort. Just set up the data dictionary, and then place calls to the appropriate Query Maker user-defined functions in your code. You can call the query list manager if you want to build and maintain saved

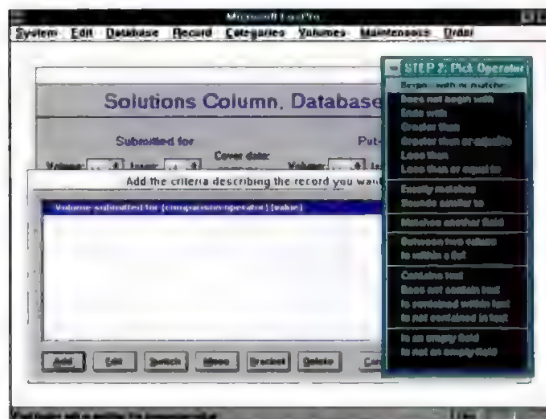


Figure 4: You can choose from a variety of operators when constructing your query condition.

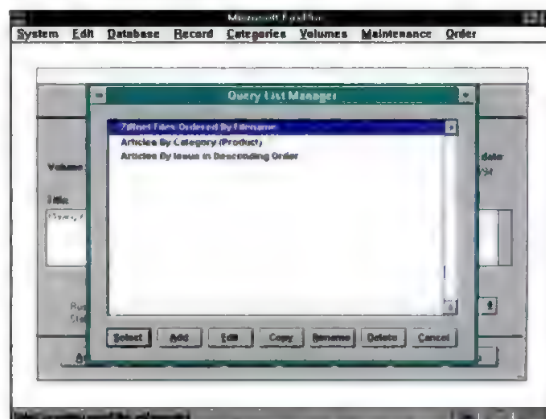


Figure 5: The Query List Manager lets you save named queries for reuse later.

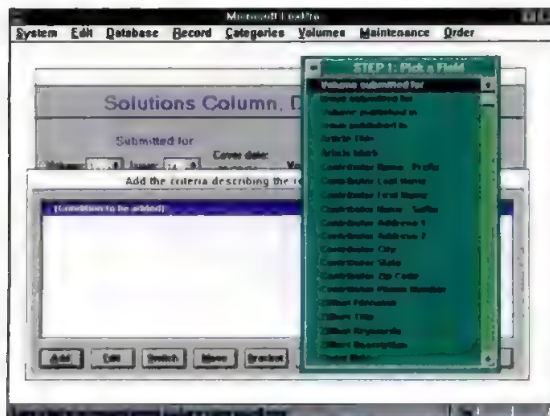


Figure 3: Query Maker lets you choose from a list of English field descriptions instead of cryptic field names.

queries, or you can call the filter builder directly for queries you don't want to save.

The FoxPro version of the product can generate and execute a SQL SELECT statement to perform the query. You can also have Query Maker return the filter condition to you as a string so you can employ it in a LOCATE or SET FILTER TO command (or any command that accepts a FOR condition). This lets you use Query Maker to return a complete result set or just to find and navigate through individual records. For example, you might do something like this:

```
cString = QM_QUERY(...)
LOCATE FOR &cString
```

The Query Maker source code is well documented and easy to read. For more information, contact Strategic Edge, 2062 Union St., #300, San Francisco, CA 94123; 415-563-3755 or CompuServe, 74660,1422. —Sal Ricciardi

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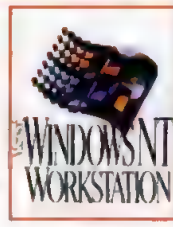


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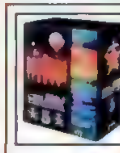
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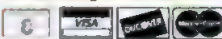
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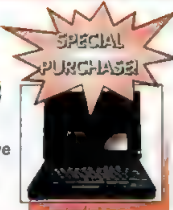
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ML380	714.95	OL400E	399.98
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ML520	369.82	4ppm 600dpi	905.50
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microWriter PS23	639.65
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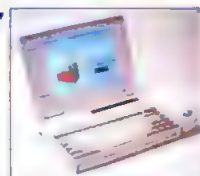
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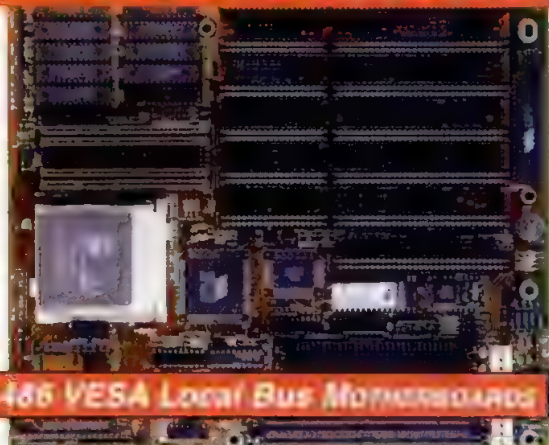
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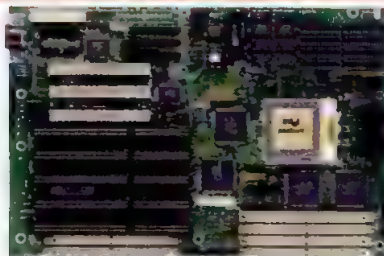
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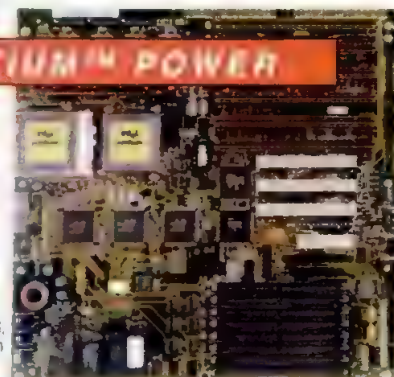
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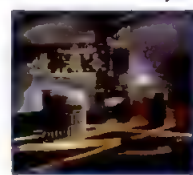
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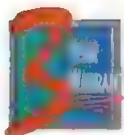
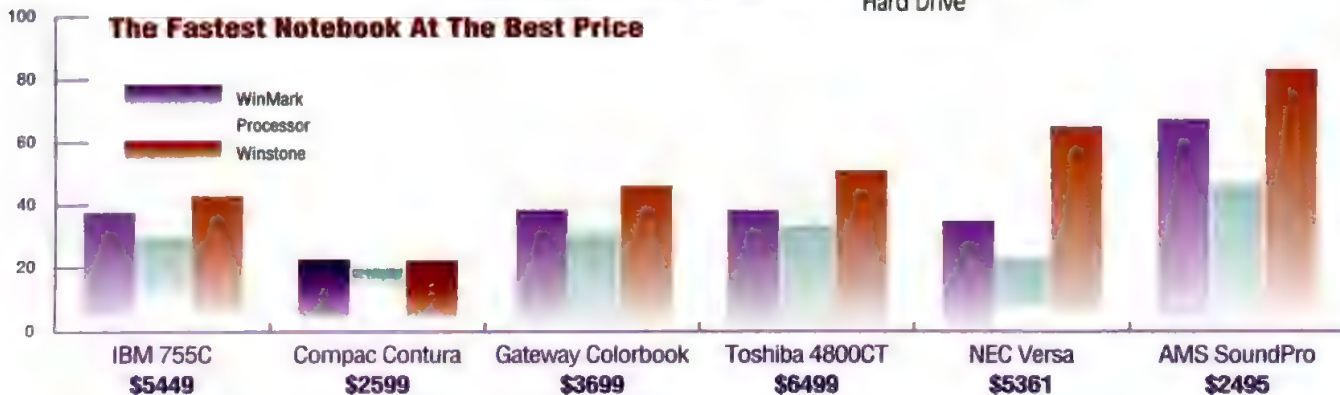
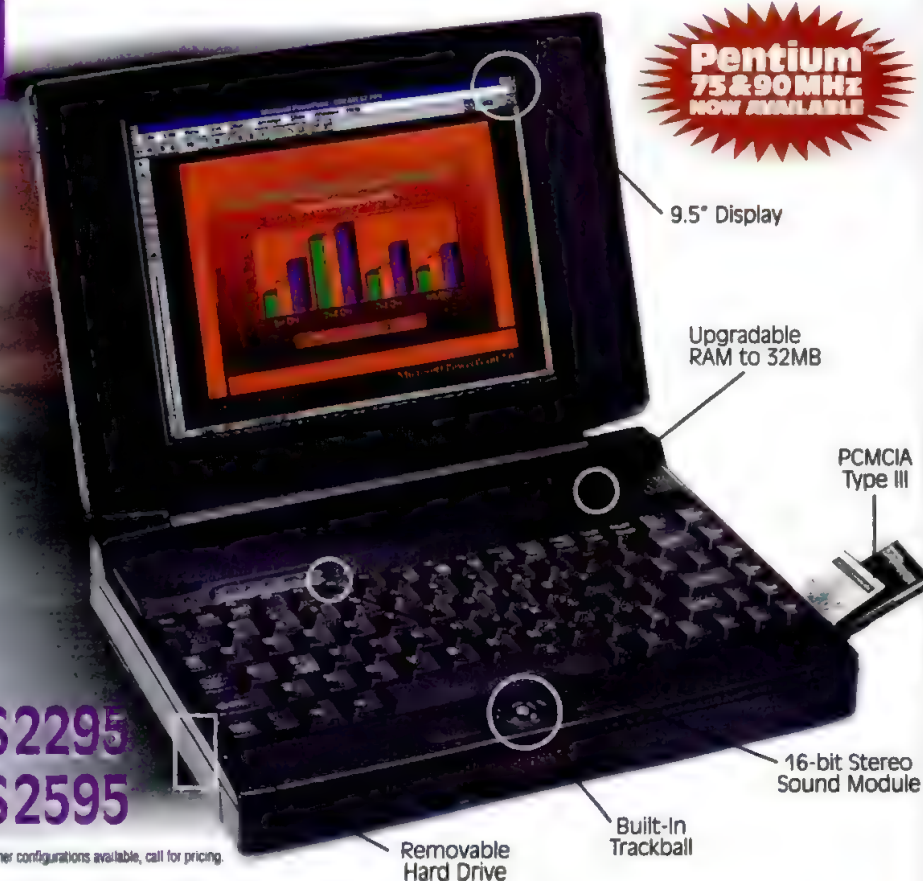
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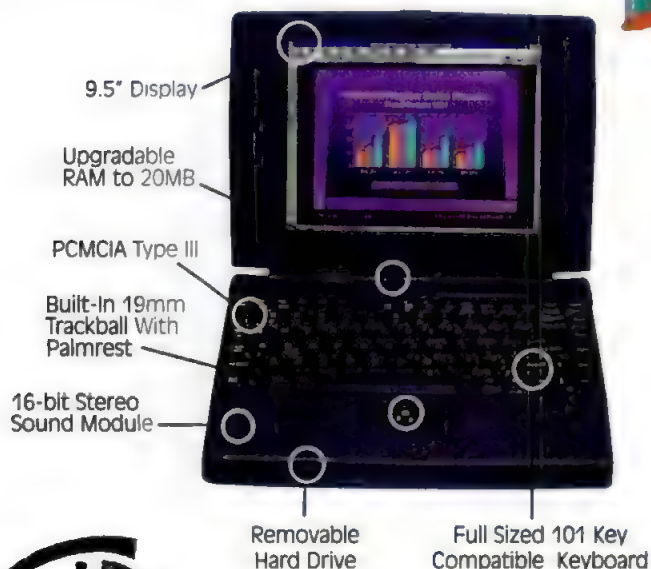
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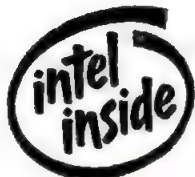
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The Nokia 17" 447L multimedia monitor with a .28 mm min pitch flat square tube, maximum resolution of 1024 x 768 at a refresh rate of 75Hz, is the caliber of display usually enjoyed by graphics professionals. Whether for work or home the 447L is particularly suitable for the graphics-rich programs families and professionals tend to run. A PC Magazine Editors' Choice, the 447L also features front panel solid-state screen adjustments and stereo powered speakers under the bezel—ideal for multimedia software. Its emissions control has earned Sweden's MPRII certification—one of the strictest standards in the world. Its ergonomics reduce eyestrain and fatigue, and demonstrate real user-sensitivity.



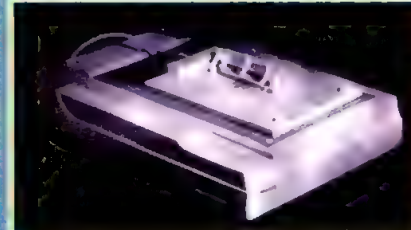
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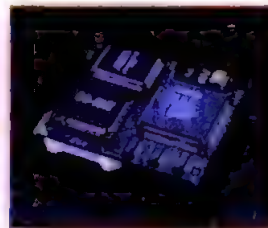
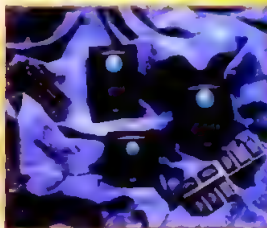
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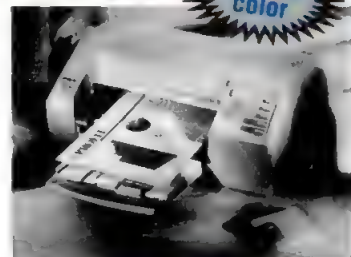
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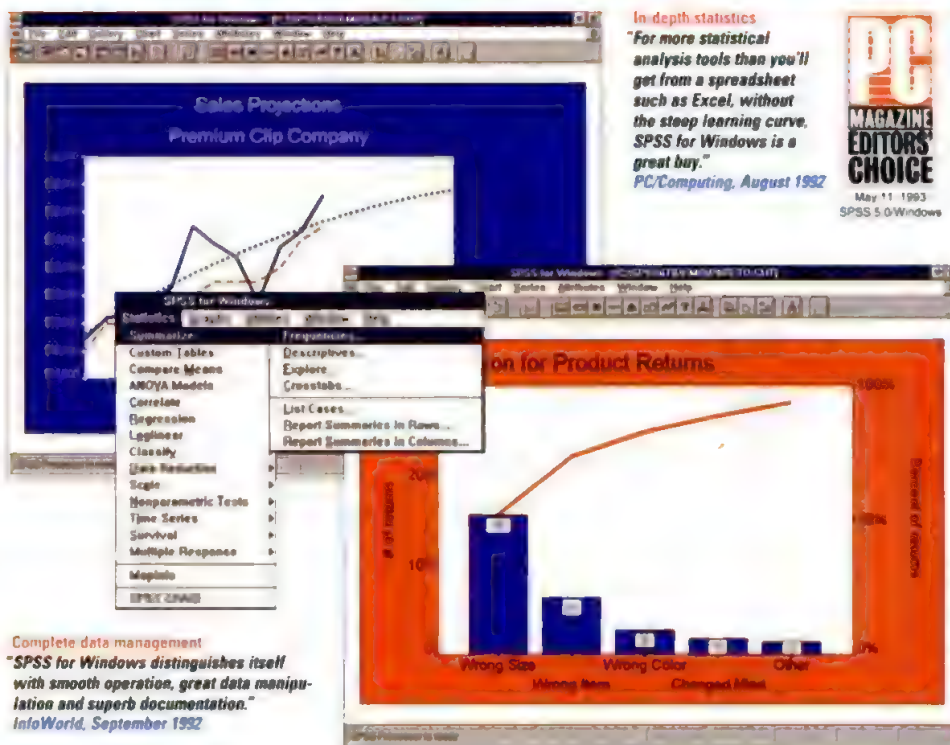
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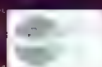
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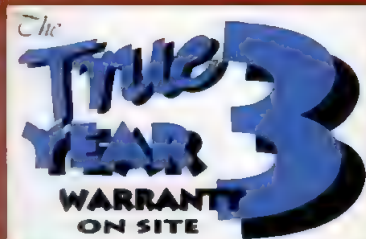
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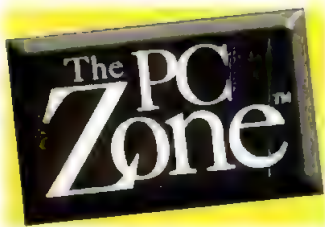
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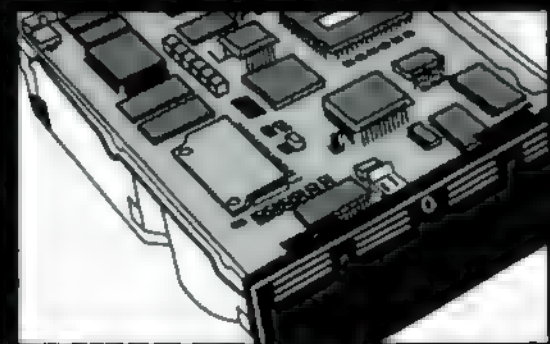
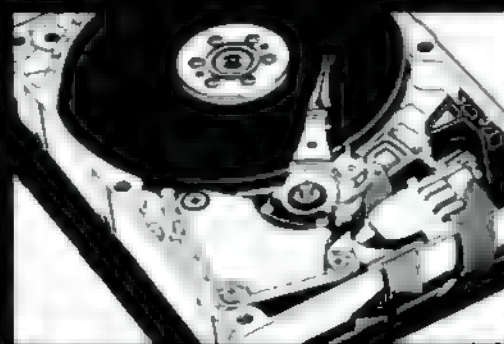
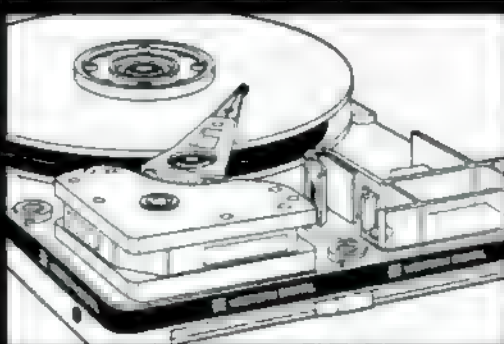
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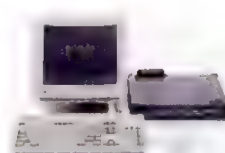
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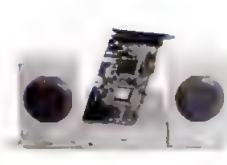
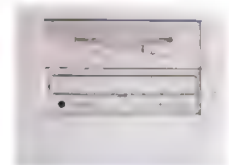
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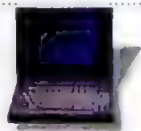
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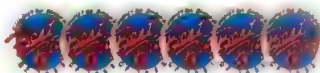
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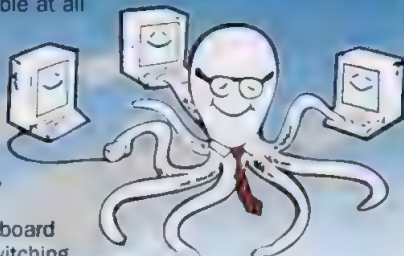
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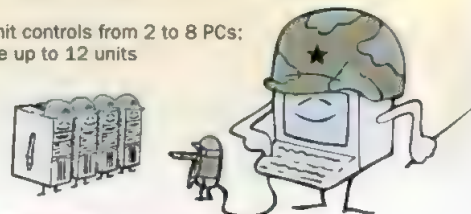
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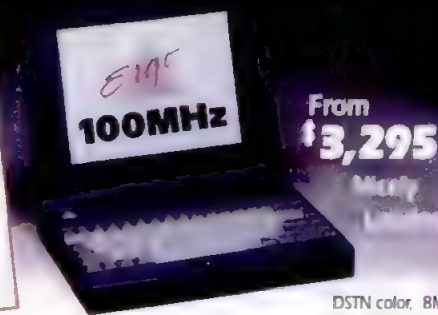
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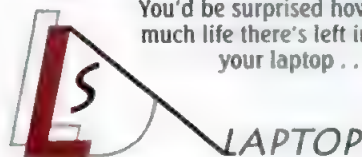
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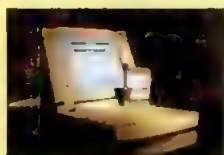
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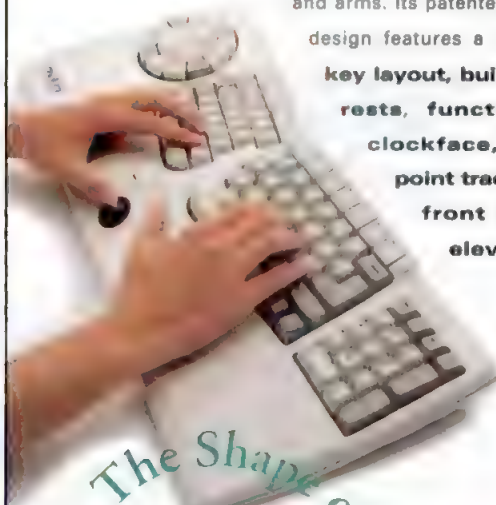
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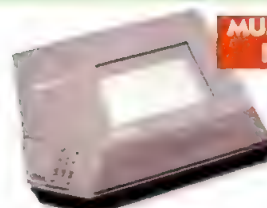
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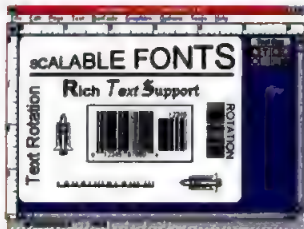
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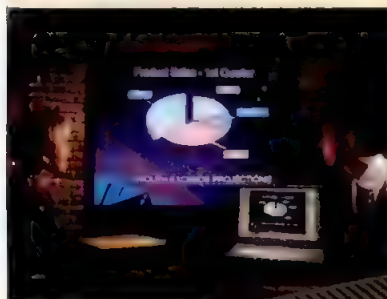


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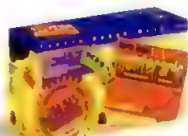
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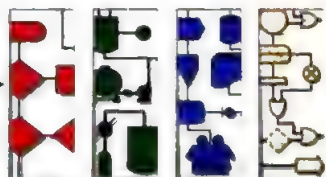
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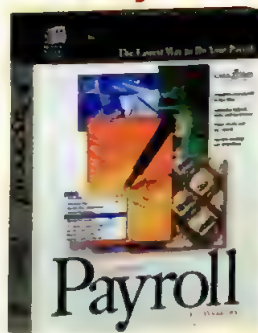
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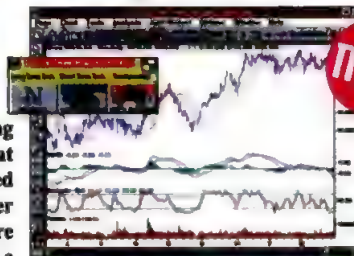
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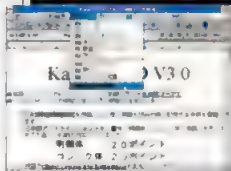
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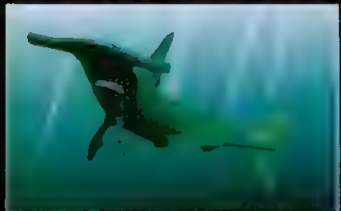
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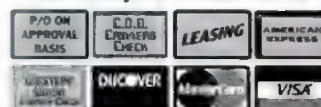
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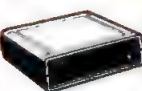
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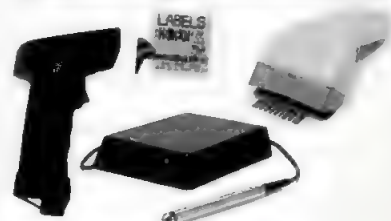
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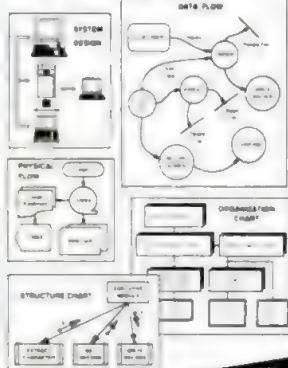
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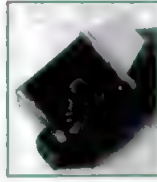
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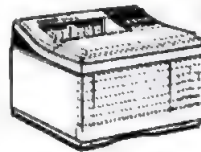
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Coming Up

Get On-Line

The decision is no longer whether to get on-line: Too much is happening there that you don't want to miss. The principal questions are what you want to achieve on-line and which service or provider will provide the easiest, cheapest method to get you there. Our annual roundup of the major commercial on-line services, with side looks at alternative front ends and Internet providers, will help you choose among good new versions of well-known services if you're just getting started—or broaden the on-line presence you already have.

Pentium Competitors

Intel's Pentium processor no longer stands alone at the high end of the x86 CPU marketplace. NexGen's Nx586 series already offers comparable performance, with even faster processors from AMD and Cyrix just around the corner. And unlike RISC processors such as those in the PowerPC family, these alternatives to Pentium are fully compatible with your existing software. This expanded competition will translate into better bargains—and tougher decisions—for PC buyers. We tell you what to expect from the new breed of Pentium-class CPUs, including how to figure out which ones are right for your computing needs and how their internal architectures have been developed to maximize speed.

Death and Taxes

It's as regular as clockwork: *PC Magazine's* fourth issue of the year heralds the arrival of tax time. Once again, as in years past, we look at all the latest and greatest tax-preparation software—packages that help you organize all your receipts, find all your deductions, plug in all your numbers, and file an accurate, timely return. This year, in addition to reviews of 11 DOS and Windows products and a look at 1 OS/2 newcomer, we include a special section on the pros and cons and tips and tricks of electronically filing your IRS return.

Help on Help

Nothing is quite as effective at conveying extensive textual information as hypertext, and the hypertext tool of choice for many developers is the user-familiar Windows 3.1 help engine. But though the engine itself is superb, some of the tools Microsoft provides to assist you in creating help files are less than ideal. Don't let these limitations cramp your style. Contributing editor Barry Simon discusses Microsoft's attempts to surmount these shortcomings—including what you can expect to see in Windows 95—in our next Corporate Developer column.

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HPSCAN11CX **\$949**

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LQ-300 Dot Matrix 24-pin 240 CPS.....	\$1
LQ-570 Dot Matrix 24-pin 325 CPS.....	2

After Hours

EDITOR'S RATINGS: ★ Poor ★★ Fair ★★★ Good ★★★★ Excellent

CD-ROM

Windows

CD-ROM

Resource-Intensive

Adult Content

Kids (Ages)

Price

¿Hablas Español?: Spanish Tutors

Spanish is the fourth most widely spoken language in the world. And with the recent trade agreements, it's a language that's growing increasingly important in the business world. The latest crop of five Windows-based language tutorials makes learning Spanish easier than ever, even for the most tongue-tied of students.

Berlitz Live! Spanish

Sierra On-Line Inc.; 206-649-9800.

Circle 487 on reader service card

★★★★ CD-ROM \$134.95

Business travelers don't need large vocabularies or a knowledge of complex grammar rules. Simple stock phrases for everyday situations will suffice, along with enough advice to avoid making major cross-cultural gaffes. Berlitz Live! Spanish meets these conditions in a colorful and entertaining way.

Live! Spanish covers the

grammatical essentials but spends most of its time teaching conversational specifics on subjects such as eating out and going through customs. Each of these sections contains



Colorful artwork and a sense of humor are part of the package in Berlitz Live! Spanish.

dozens of useful phrases ("We have 80 percent of the U.S.

market"). There are hotkey screens where you can click objects to find out their names and chapter-end quizzes to test how much you've learned. Live! Spanish also supplies cultural tips. Everything here you'll find in a decent travel book, such as visa require-

ments and advice on how to greet new contacts, but Live! Spanish accompanies it all with folk melodies.

Stunning artwork, interactive dialogues, well-chosen phrases, quizzes, and folk songs make Live! Spanish an entertaining and useful tool for business travelers.

Learn to Speak Spanish

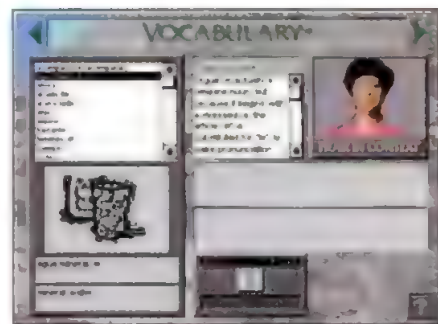
Hyperglot Software Co.; 800-726-5087, 615-558-8270.

Circle 486 on reader service card

★★★★ CD-ROM \$179.95

With Learn to Speak Spanish, you'll not only understand the language, you'll speak it fluently.

This program uses an all-inclusive approach in its 30 chapters. You hear a word in context in one of 60 staged conversations. Then you read the word in written transcripts of dialogue, see it represented as an object, say it using an optional microphone to record your voice, and write it in a series of sentence-based drills. The program also



Learn to Speak Spanish incorporates grammatical tips and written and verbal exercises.

offers easy-to-access hints and translations.

This program is definitely not for the person who just wants to learn the basics. But given time, patience, and dedication, its approach will pay off handsomely.

Power Spanish

BayWare Inc.; 800-538-8867, 415-286-4480.

Circle 484 on reader service card

★★★★ CD-ROM \$149

Instilling you with linguistic confidence rather than expertise is the main goal of Power Spanish. The focus isn't on teaching grammatical rules. The package instead sets out to bring students quickly up to the level of simple conversation.



Power Spanish's approach to learning a language is visually striking and effective.

AFTER HOURS INDEX	
Spanish Tutors	Quick Clips
Berlitz Live! Spanish.....377	NFL's Greatest Plays.....382
Learn to Speak Spanish.....377	Skier's Encyclopedia on CD-ROM.....382
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Triple Play Plus Spanish.....378	Zoo-Opolis!.....382
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Spanish Assistant for Windows.....382	

After Hours

The methods used toward achieving this make Power Spanish a maverick among Spanish tutorials. It avoids cultural discussions; there are, for example, no references to Latin America or Spain. Visual associations between words and objects are eschewed, and new words aren't usually introduced within vocabulary lessons; they occur in sentences beside already familiar terms. It's up to you to click on any word you don't know if you want to hear

its translation and pronunciation. Expect very little grammar instruction from Power Spanish. You will, however, find a set of lessons—which you may explore in or out of sequence—and a series of games, drills, and exercises that encourage you to start using the language as quickly as possible. Power Spanish also includes a 10,000-word dictionary, grammatical reference tables, and a bundled copy of Microtac Software's Spanish Assistant for Windows.

If you come to Power Spanish expecting a traditional language course, you'll be disappointed. But if you're prepared

to adapt to its appearance and teaching methods, you'll find yourself on an effective path to beginning-Spanish mastery.

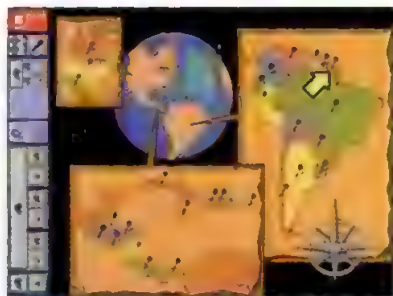
Triple Play Plus Spanish

Syracuse Language Systems; 315-478-6729.

Circle 488 on reader service card

★★★   \$99.95

Triple Play Plus Spanish teaches object names and modifiers via 20 colorful games including bingo, Concentration, jigsaw puzzles,



Triple Play Plus Spanish features dozens of attractive games.

and map activities. Just choose your subject category—Home and Office, Transportation, People, Food, Numbers, or Ac-

PROBLEM SOLVER

Before you choose a language tutor, decide what your goal is. Do you want to learn just enough Spanish to order a meal, or do you want total mastery of the language? Your goal will determine which package is best for you.

tivities—and prepare to be entertained. There are multiple levels of difficulty and practice modes. An additional 12 games, which take the form of talking comic strips, highlight commonplace situations such as visiting a restaurant. The games involve matching spoken passages to the correct visual frames. It's not as hard as it sounds, since you can hear dialogue at a slow speed, repeat

isolated words and phrases, and access on-line help.

Some of the program's games integrate speech recognition. Using the included microphone, you can, for example, supply a requested object name instead of clicking on the answer.

In sum, no Spanish tutorial is easier to use than Triple Play Plus Spanish.

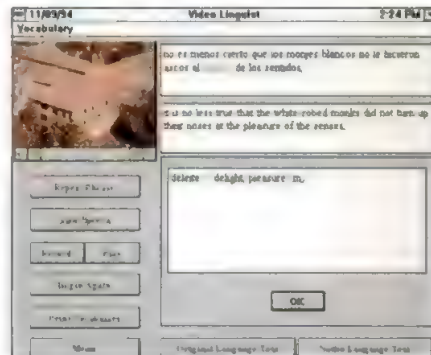
Video Linguist Spanish

Cubic Media; 800-232-8242, 215-576-1200.

Circle 485 on reader service card

★★★   \$99

Video Linguist Spanish takes a very different approach to teaching Spanish. It offers no games, word lists, or grammar lessons—just 44 videos taken straight from Spanish television. And they aren't simply reruns of Robin Hood crying “Buenos noches, Sheriff de Nottingham” as he escapes out a window, either. These video clips concentrate on a range of typical Spanish



Using Video Linguist Spanish is like having a translator at your side.

television programming; you'll hear a running commentary on a basketball game and explore several of Spain's most famous art museums, for example.

You can switch between English and Spanish subtitles, or turn them off altogether. Highlight a word or phrase and the cinematics stop; you'll receive an instantaneous translation from the 3,000-word dictionary. Once you've got it down pat, you can record and play back your own pronunciation.

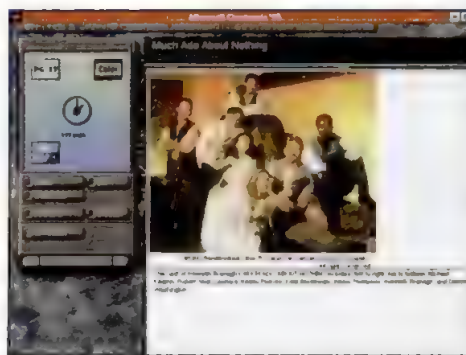
An absence of hand-holding might make the program a bit daunting for the beginner, but Video Linguist is a perfect follow-up to Triple Play Plus Spanish or Live! Spanish.

—Barry Brenesal

Cinemanía '95

Like fine wine, Cinemanía just gets better with age. This latest edition of the CD-ROM classic guide to film is bigger and better than ever. Here you'll find all the information you need to answer even the toughest cinema trivia question or to choose the perfect video to rent for a family night at the movies.

New to the 1995 edition of Cinemanía are the ListMaker feature for compiling lists of your favorite (or least favorite) movies, and Cinemanía Suggests, an automated movie-recommendation service for when you know what genre you're interested in, but not what film within that genre. Of course, you'll still find the features Cinemanía has become well known for: movie reviews from Roger Ebert, Pauline Kael, and Leonard Maltin; biographies and



filmographies; an awards list; articles on movie topics; and a gallery of movie stills, clips, and audio tracks.

—Gayle C. Ehrenman

Microsoft Corp.; 800-426-9400.

Circle 490 on reader service card

★★★★   \$59.95

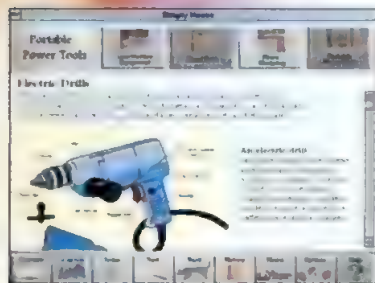
Introducing Simply House.[™] The Home Improvement CD With Everything From Soup To Nuts.



If you're a do-it-yourselfer with an appetite for knowledge, Simply House is the CD-ROM for you. Based on *The Stanley Complete Step-by-Step Book Of Home Repair And Improvement*, it's a veritable smorgasbord of information. From sealing basement walls to insulating the attic, Simply

House covers nearly any project you can think of.

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Hundreds of illustrations make every job easier.

Simply House also covers tools, equipment, materials, finishes and hardware — even information on home safety and security. All clearly explained with

over 500 pages of text and more than 1,400 full color illustrations. Plus there are dozens of helpful video clips which appear full-color and full-screen on Pentium PCs.

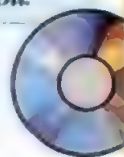
What's more, interactive point-and-click capabilities let you access information quickly and easily. Find the topic you're looking for simply by clicking in the area of interest on the floorplan, or use the alphabetized index.

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CIRCLE 216 ON READER SERVICE CARD

CHOOSY BUYER

LET'S FACE IT, today's business computer market is no picnic. In fact, with so much competition, product advertisers are finding it increasingly important to reach committed business buyers without waste. So when buyers cite certain magazines—Ziff-Davis magazines to be exact—as their preferred choice for purchasing information, advertisers take note. And action.

Business buyers who are involved in selecting computer products for their companies have a weighty responsibility. They must choose wisely. Because the wrong system, software or peripheral can lead to costly, career-threatening mistakes today and down the road.

In over 60 independent studies since 1987, buyers cite Ziff-Davis magazines as their preferred choice for purchasing information.



These buyers need timely, objective news and reliable product evaluations to guide their purchasing decisions. Which makes them very choosy about where they get their information.

They know some publications meet their needs better than others. Those are the ones they turn to first, trust the most and spend the most time reading.

Independent studies confirm that buyers prefer Ziff-Davis magazines.

In more than 60 independent studies conducted over the past six years, buyers have cited Ziff-Davis magazines as their number one choice for purchasing information. In many cases, Ziff magazines have been their choice by 2-to-1 or more over their nearest competitors.

Whether they've been selected at trade shows, from vendors' lists or

S CHOOSE ZIFF.



from user groups, buyers have consistently named our magazines as "most useful", "most authoritative for labs-based product reviews" and "best at delivering timely news and analysis."

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Our popularity has been earned through the efforts of the largest, most distinguished editorial staff in the industry. Their unmatched technology and business solutions expertise has resulted in thousands of pages of

quality journalism to inform and assist buyers with their decisions.

And all of our editorial is supported by the extensive product testing that comes from four magazine-specific labs plus ZD Labs, the world's largest independent computer testing facility.

#1 with advertisers, too.

When you're number one with buyers, it's not surprising that marketers also make you first for advertising. After all,

what better place is there for their messages to be seen and read? For the first 5 months of 1994, 46% of all advertising in major computer publications ran in seven Ziff-Davis magazines. The rest of the advertising was scattered among 15 other publications.*

Why do advertisers so overwhelmingly prefer Ziff-Davis magazines? Quite simply, they work. Advertisers know the magazines deliver those choosy business buyers who buy their products.

And to help them reach these buyers more effectively, we've created The Ziff-Davis Magazine Networks — an integrated, complementary set of publications that address every key person involved in the buying process.

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**The Ziff-Davis
Magazine Networks**

After Hours

Language

Translating from English to Spanish and Back Again

Spanish Assistant for Windows

Microtac Software; 619-272-5700.

Circle 489 on reader service card

★★★★WIN \$69.95

You can get by in spoken Spanish using simple objects and modifiers, but in business letters your Spanish must be idiomatic and grammatically above criticism. That's where Spanish Assistant for Windows enters the picture. It's a translation tool that can handle anything from a word to a book in Ami Pro, Microsoft Word, Microsoft Write, and WordPerfect formats.

At the core of Spanish Assis-

tant is a 100,000-word bilingual dictionary that contains most forms of commonly used words and idiomatic expressions. Of course, Spanish Assistant's accuracy has its limits. There's no artificial intelligence, so it won't "learn" from repeated literary conventions. As a result, Spanish Assistant is far better at handling straightforward business correspondence than academic papers or special-interest articles. —BB

QUICK CLIPS

Recommended
by Your Call
Now Recommended

? NFL's Greatest Plays

The 75 plays on this CD-ROM are well chosen, and the multiple camera angles are a fun trick. If only the video quality were as breathtaking as the Immaculate Reception. \$25; Turner Interactive; 404-827-2890.

? Skier's Encyclopedia on CD-ROM

One-stop shopping for ski fanatics, which includes resort information, trail maps, and instruction and equipment videos. We might love this thing if the resort info weren't so sparse and the equipment videos such blatant brand advertisements. \$49.95; Romboy; 818-752-5900.

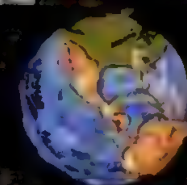
↓ Tate Gallery—Exploring Modern Art

You won't doze off during this art-appreciation class on CD-ROM, but you will wonder at a selection that devotes as much space to Barbara Hepworth (who?) as it does to Picasso. \$49.95; Attica Cybernetics; 800-862-2206.

↑ Zoo-opolis!

Kids aged 3 to 6 will love finding out what's new at the zoo with this CD-ROM full of baby-animal videos, animations, games, jokes, and songs. \$49.95; Compton's NewMedia; 619-929-2500.

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SPANISH

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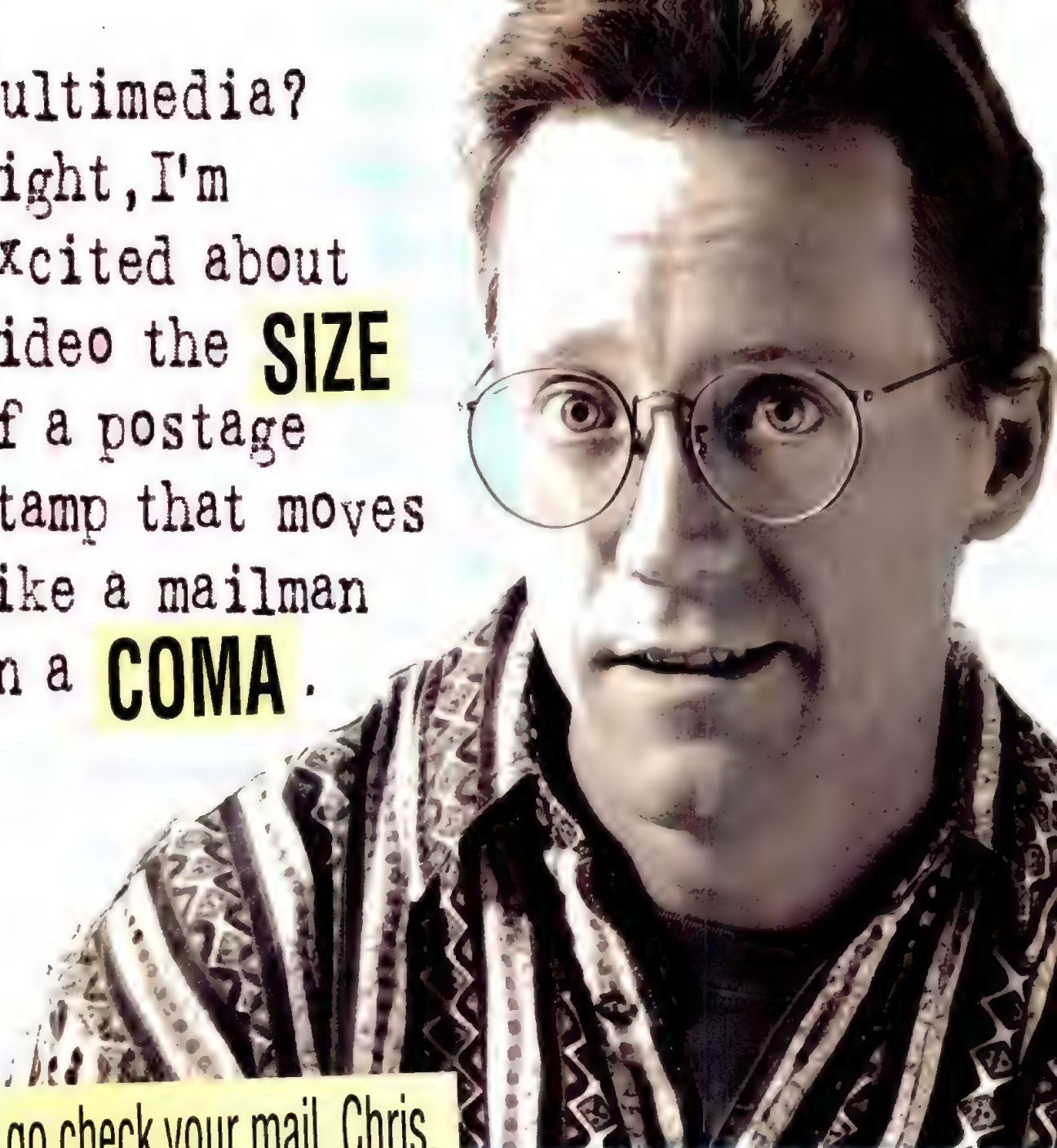
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OLD MULTIMEDIA



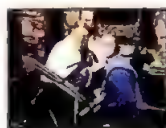
“Old” Video Image

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SIGMA DESIGNS

After Hours

Adventure Play Guitar

Virtual Music

Ahead Inc.; 800-872-7827.

Circle 502 on reader service card



So you want to be a rock-and-roll star, but you're stuck at your PC all day? Not to worry. Strap on your Virtual Guitar and enter the world of West Feedback, where anyone who can hit the beat can make it to the big time.

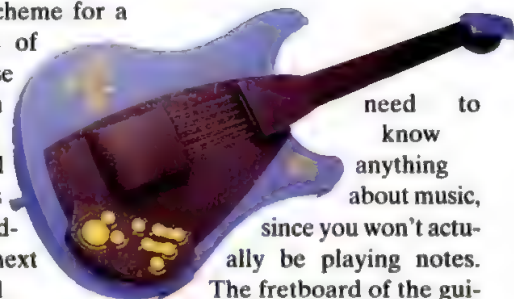
Virtual Music is an air guitarist's dream come true. The system includes the Welcome to West Feedback game CD-ROM and the aforementioned Virtual Guitar. The Virtual Guitar, which is roughly 95 percent the size of a standard electric guitar, serves as your game controller in the rock-and-roll fantasy game that is West Feedback. You use it as both

a pointing device and as a musical-input device.

In the West Feedback adventure, you're a grungy guitar-playing kid who dreams of unseating Eric Clapton as this generation's rock god. To make it to the top, or in this case to the stage of the local club (The Dead Inn), you'll have to start practicing in your bedroom. Here you can strum along with a variety of songs, including selections from Cracker, Pantera, and Gin Blossoms, until you get the rhythm down. A handy visual aid called the Rhythm

EKG (REKG) displays the proper rhythm scheme for a song as a series of spikes. Match those spikes as you strum along to the music, and you'll earn the points necessary for advancing to the next level of musical success: playing with a local garage band. Click with the band and you'll pick up an agent who can guide you to the stage of the Dead Inn. Whether you win or lose will depend on how much the concert-goers appreciate your performance and how many credibility points you amass along the road to fame.

To make it to the end of this game, all you need is a sense of rhythm and some persistence. You don't



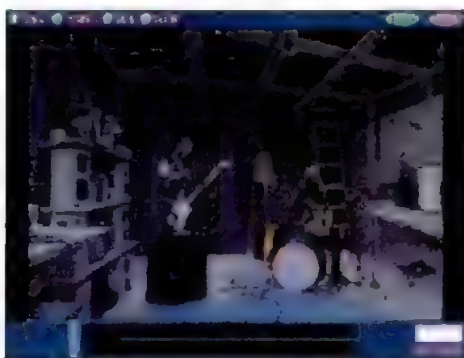
need to know anything about music, since you won't actually be playing notes.

The fretboard of the guitar is inactive, and the six strings are really just one guitar string artfully wound.

You'll want to hang on to your Virtual Guitar when you've made it to the top of West Feedback. Upcoming adventures will let you play along with Aerosmith, as well as other music notables. And you'll be able to start a virtual band before long, when Virtual Drums, Virtual Keyboard, and Virtual Bass are released.

Virtual Music won't help you learn to play guitar, but who needs lessons when you can star in your own rock-and-roll fantasy?

—Gayle C. Ehrenman



Virtual Music lets you fulfill your rock and roll fantasies in the privacy of your home.

SPOTLIGHT ON

KIDS

Reader Rabbit's Interactive Journey

Think of Reader Rabbit's Interactive Reading Journey as the Swiss Army knife of reading programs; it combines phonics and sight-reading and includes animation, music, and spoken words—all of which will keep your child amused while she learns to read. In this program, children travel with Reader Rabbit, his friend Mat the Mouse, and Sam the Lion through 20 Letter Lands. Each Letter Land has a Skill House, where children learn phonics and words through games and activities, and two Storybooks, which introduce new words and offer simple sentences. When kids click on hot spots in each Letter Land, they discover sounds and animations that begin with the letter being learned.

The curriculum for Reader Rabbit's Interactive Reading Journey is based on the highly successful Southwest Regional Laboratory for Educational Research



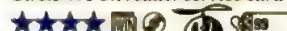
and Development Beginning Reading program and gives children a whole year's worth of reading activity. The program allows parents to tailor lessons to

their children's needs by determining the percentage of correct answers required to advance to the next level, how many Letter Lands are available at one time, and whether the Interactive Journey characters or the child reads the Storybooks.

The program presents new material and reinforces what has already been learned in a supportive, nonthreatening manner that encourages children to discover and learn while they journey down the road that will lead to a lifetime of reading pleasure.—Charles Taft

Reader Rabbit's Interactive Reading Journey; The Learning Company; 800-852-2255.

Circle 491 on reader service card



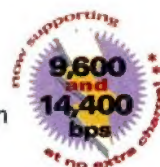
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Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

How's That Again?

"Every 11 years there is a sunspot eruption, which causes static on CB radio transmissions (CB radio is now more commonly known as the 'Internet')."

—SKY MAGAZINE

"For a low one-time membership fee of \$8.95 a month, you can use our most popular services. . ."

—COMPU SERVE ADVERTISEMENT

"Word for Windows 6.0: Self-Teaching Guide. . . This book makes a good guide [but] surprisingly limits its audience to half by assuming that the reader is working in Windows." —COMPUTERUSER

If you want to give your PCs a performance boost, next to removing the CPU, one of the most effective things you can do is to add more memory. It's what is

They didn't quite say what they meant. (Options by IBM brochure.)

Clip Art Comes to Life!

Six issues ago we pointed out how two different companies had each represented their staffs with the same piece of cheesy clip art. Eagle-eyed reader Kenneth Ray took a look and said, "Hey! I know those guys!" In fact, he worked with them at McDonnell Douglas. Six years ago a

photo of the group was used in an ad, and



somehow that photo became clip art. Our congratulations to Tom Schwab, Bob Baker, Steve Theby, Jim

Strecker, and Steve Wallace. You're all clip-art immortals now.

Hey, It Worked On the Back of Cereal Boxes

The producers of the CD-ROM interactive movie "Under a Killing Moon" sent out promotional CDs made of cardboard. We chose not to follow the instructions printed on the disk: "Insert this disk in your CD-ROM drive. Type D:DEMO."



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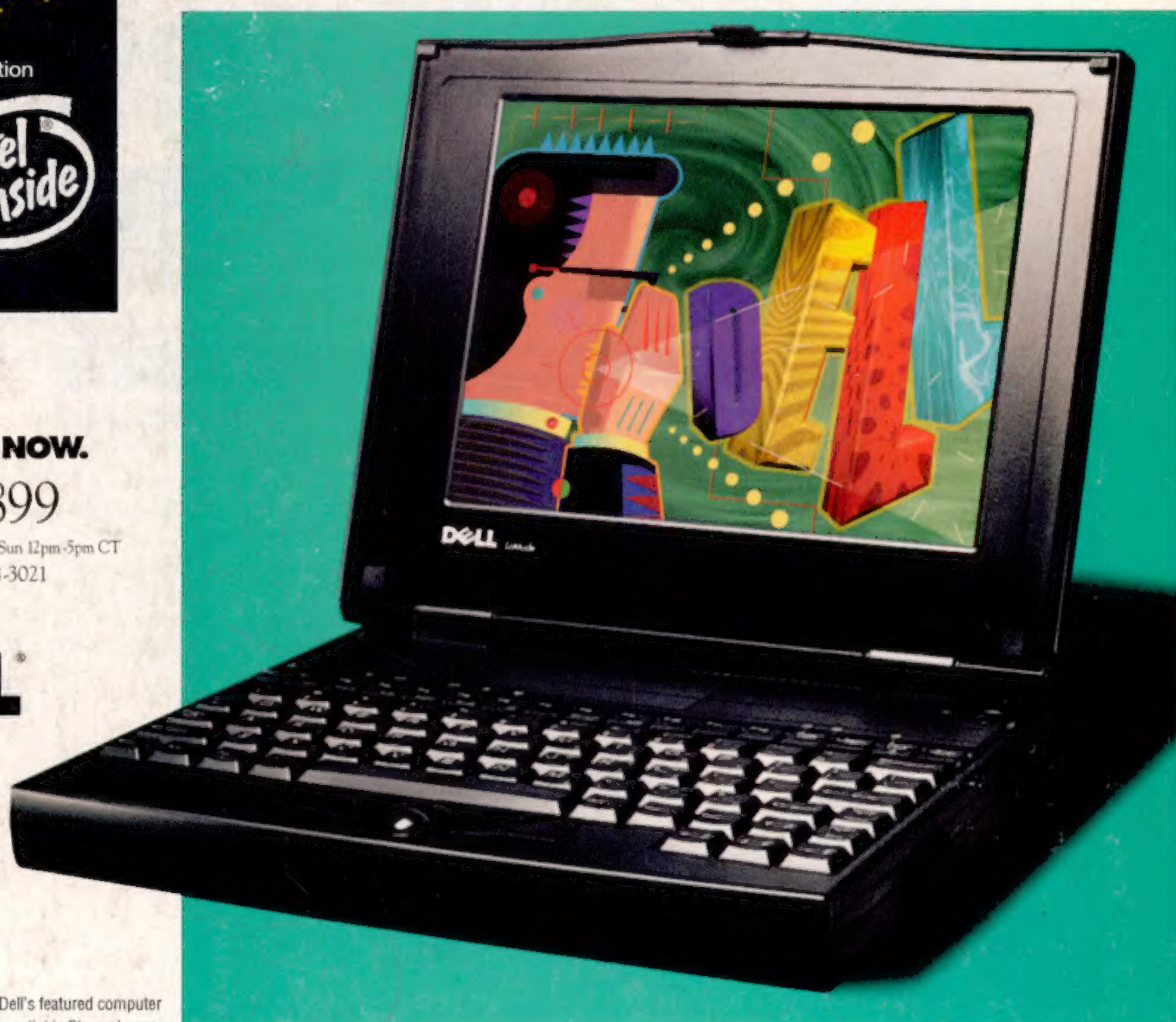
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